WATER QUALITY DATA ASSESSMENT FOR THE OUACHITA RIVER, BETWEEN FELSENTHAL RESERVOIR LOCK AND DAM, ARKANSAS AND STERLINGTON, LOUISIANA

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 6

Prepared by:

PARSONS

AUSTIN, TX

JANUARY 2003

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EXECUTIVE SUMMARY

EPA Region 6 requested Parsons to compile and assess available literature, ambient data, and other information to determine the status of water quality in Arkansas and Louisiana for the Ouachita River from Felsenthal Reservoir Lock and Dam, Arkansas to Sterlington**,** Louisiana. This report summarizes available data and information to assess attainment of narrative and numeric water quality standards for this portion of the Ouachita River in Arkansas and Louisiana.

The Ouachita River from Felsenthal Reservoir, Arkansas to Sterlington**,** Louisiana forms the boundary between Union and Ashley County in Arkansas and Union and Morehouse Parish in Louisiana. While the watershed is primarily rural, the segment of the Ouachita River addressed in this report is influenced by several land use activities including oil and gas operations, forest production, agriculture, dredging, and industrial discharges. The lowest monthly average flow rate of 2,605 cubic feet per second (cfs), during the period of record, occurred in September. The data are sporadic during high flow months, with March averaging 8,583 cfs using monthly averages in 1967, 1971, and 1972. There is one water quality monitoring station in Arkansas between Felsenthal Reservoir and Coffee Creek, and one in Louisiana at Sterlington. The spatial location of these two sites along the River provides limited understanding of the key anthropogenic impacts on water quality.

The designated uses for Segment 2D (lower Ouachita River) as defined in the Arkansas state water quality standards are propagation of fish/wildlife, primary and secondary contact recreation, perennial Gulf Coast fishery, and public, industrial, and agriculture water supplies (ADEQ 2000). The designated uses for Subsegment 080101 in the Louisiana state water quality standards are primary and secondary recreation, fish and wildlife propagation, and drinking water supply designated uses.

The Arkansas Department of Environmental Quality (ADEQ) Draft 2002 303(d) List indicates fish consumption uses are not supported for the Ouachita River below Felsenthal Reservoir due to mercury contamination from an unknown source. According to the Louisiana Department of Environmental Quality's (LDEQ) 2000 draft 305(b) report, all uses are fully supported except fish and wildlife propagation. LDEQ has indicated in its Draft 2002 §303(d) List that the contact recreational use is not supported based on recently collected bacteria data.

The report provides a summary evaluation of water quality in the Ouachita River below Felsenthal Reservoir by comparing available historical data to the Arkansas and Louisiana state water quality standards. Section 2 of the report provides a summary of existing water quality data for the narrative and numeric criteria of Arkansas and Louisiana. Section 3 summarizes the key permit requirements of the Georgia-Pacific Mill located in Crossett, Arkansas. Section 4 provides general recommendations and the rationale for conducting additional water quality monitoring along the Ouachita River from Felsenthal Reservoir to Sterlington, Louisiana. In evaluating the potential impact of

the Georgia-Pacific mill (G-P) effluent discharged from Coffee Creek into the Ouachita River, a number of factors were identified that may affect the water quality in the Ouachita River. G-P's Crossett, Arkansas paper mill (NPDES permit number AR 0001210) has been permitted to discharge 48.5 MGD to the Ouachita River via Coffee Creek and Mossy Lake. According to the provisions of this permit, Georgia Pacific is allowed to discharge effluent to Coffee Creek and Mossy Lake via Outfall 001. The outlet of Mossy Lake is to the Ouachita River and is considered Outfall 002. The effluent is primarily composed of wastewater from paper production operations, including the plant's sanitary facilities. Other wastewater discharges from the facility include approximately 1.6 MGD added by its building products operations, 0.4 MGD resulting from its chemical plant operations, and an additional 1.0 MGD of treated sanitary wastewater contributed by the City of Crossett to G-P's treatment upstream of the aerated basin. Coffee Creek and Mossy Lake provide some measure of dilution and effluent polishing by natural degradation processes and are considered to be part of G-P's treatment processes. Georgia Pacific has performed fish tissue analyses for dioxin as part of their permit requirements. Although tissue concentrations were elevated in the early '90s, they have steadily declined and have been below the Louisiana Department of Health and Hospitals' human health-based screening value of 1.56 mg/kg since 1996.

In completing this report it became clear that providing an adequate assessment of narrative and numeric water quality standards for this portion of the Ouachita River in Arkansas and Louisiana was hampered by three conditions. First, for many of the narrative criteria the quality and quantity of data collected by ADEQ and LDEQ was limited.

Second, the quality of the data sets for both narrative and numeric criteria is marginal. For example, some of the data addressing narrative criteria are anecdotal, and some of the units of measurement for data sets used related to color and turbidity are unknown. For numeric criteria the value of the metals data collected between 1990 and 1999 is limited since ultra clean sampling techniques were not used.

Finally, there is not sufficient spatial coverage and in some cases temporal coverage provided by existing data sets to provide an adequate assessment of typical water quality conditions and use attainment particularly for the portion of the Ouachita River below Coffee Creek. The water quality monitoring network along the Ouachita River is insufficient to thoroughly assess the impacts from the oil and gas operations, forest production, agriculture, dredging, and industrial discharges activities affecting the watershed.

A comprehensive intensive survey should be considered for the Ouachita River, Coffee Creek and Mossy Lake. The list of water quality concerns identified in this report should be addressed through a strategic, watershed–based monitoring plan and QAPP. Data quality objectives should be clearly defined as part of the QAPP. Given the complex nature of this water body and the interaction of numerous concerns associated with multiple narrative and numeric criteria, chemical, physical, and biological data for all priority pollutants should be collected to more accurately assess water quality conditions. The sampling plan should place specific emphasis on collecting data for the following criteria defined by state narrative and numeric water quality standards:

- Narrative Criteria: color, turbidity, nutrients, ambient toxicity, biological integrity
- Numeric Criteria: chlorides, sulfates, TDS, dissolved oxygen, fecal coliform, toxic substances, metals,

All data collection needs recommended in this report will need to be prioritized through close coordination between USEPA Region 6, LDEQ, and ADEQ.

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ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
ACC	Arkansas Administrative Code
ADEQ	Arkansas Department of Environmental Quality
ASWQS	Arkansas surface water quality standards
BASINS	Better Assessment Science Integrating Point and Non point Sources
BOD	Biochemical oxygen demand
cfs	Cubic feet per seconds
CFU	Colony forming units
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
FDA	Food and Drug Administration
FTN	FTN Associates, Ltd.
G-P	Georgia-Pacific Crossett, Arkansas
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LMB	Large mouth bass
LORWG	Lower Ouachita River Work Group
LSWQS	Louisiana surface water quality standards
MGD	Million gallons per day
NGVD	National geodetic vertical datum of 1929
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
ORM	Ouachita River mile
PAH	Polycyclic aromatic hydrocarbon
PPS	Priority pollutant scan
PQL	Practical quantification limit
QAPP	Quality assurance project plan
s.u.	Standard unit
TDS	Total dissolved solids
TEC	Toxic equivalent concentration
TMDL	Total Maximum Daily Load
TSS	Total suspended solids
UAA	Use attainability analysis
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

SECTION 1
INTRODUCTION

1.1 PURPOSE

The purpose of this report is to present a water quality assessment of the Ouachita River from Felsenthal Reservoir Lock and Dam, Arkansas, to Sterlington, Louisiana, including Coffee Creek and Mossy Lake. Available literature, ambient data, and other information were reviewed to assess attainment of narrative and numeric water quality standards for this reach of the Ouachita River in Arkansas and Louisiana. An objective of this report is to assess the pollutant contributions from the Georgia Pacific-Crossett Mill to determine if the discharges are causing or contributing to the impairment of designated uses. Additionally, this report provides data to support future decisions about sampling activities that might be required to further evaluate the attainment of applicable water quality standards.

1.1.1 General Description of the Ouachita River Watershed

Headwaters of the Ouachita River are in the Ouachita Mountains near Eagleton, in western Arkansas. The water flows southeast to form Lake Ouachita near Hotsprings, Arkansas. The River then continues south through a series of lakes, including Felsenthal Reservoir, approximately 6 miles upstream from the Arkansas-Louisiana border (see Figure 1.1). The Ouachita River flows through northeast Louisiana and joins the Tensas River to form the Black River. The Black River is a large tributary to the Red River, which is a tributary of the Mississippi River. This report focuses on the 31-mile reach of the Ouachita River from Felsenthal Reservoir Lock and Dam, Arkansas to Sterlington, Louisiana.

The segment of the Ouachita River from Felsenthal Reservoir, Arkansas to Sterlington, Louisiana, is subject to potential impacts from the oil and gas exploration and production, contaminated sediment runoff, and agricultural/commercial/industrial contaminants (U.S. Fish and Wildlife Service [USF&WS] 1992). Additionally, portions of this segment of the Ouachita River are periodically dredged to accommodate barge traffic, which is light on the Ouachita River (U.S. Army Corps of Engineers [USACE] 2002).

A chain of locks and dams was initiated by the Vicksburg District in the 1960s with the objective being to link the ports along the Ouachita River to the Gulf of Mexico. This was achieved in 1984 with completion of the H. K. Thatcher and Felsenthal locks and dams in Arkansas. These locks, along with Columbia and Jonesville locks in Louisiana, now provide year-round 9-foot navigation to Camden, Arkansas.

Table 1.1 below, is for informational purposes only since it provides a summary of the land use categories for the entire lower Ouachita-Bayou De Loutre River Basin (HUC

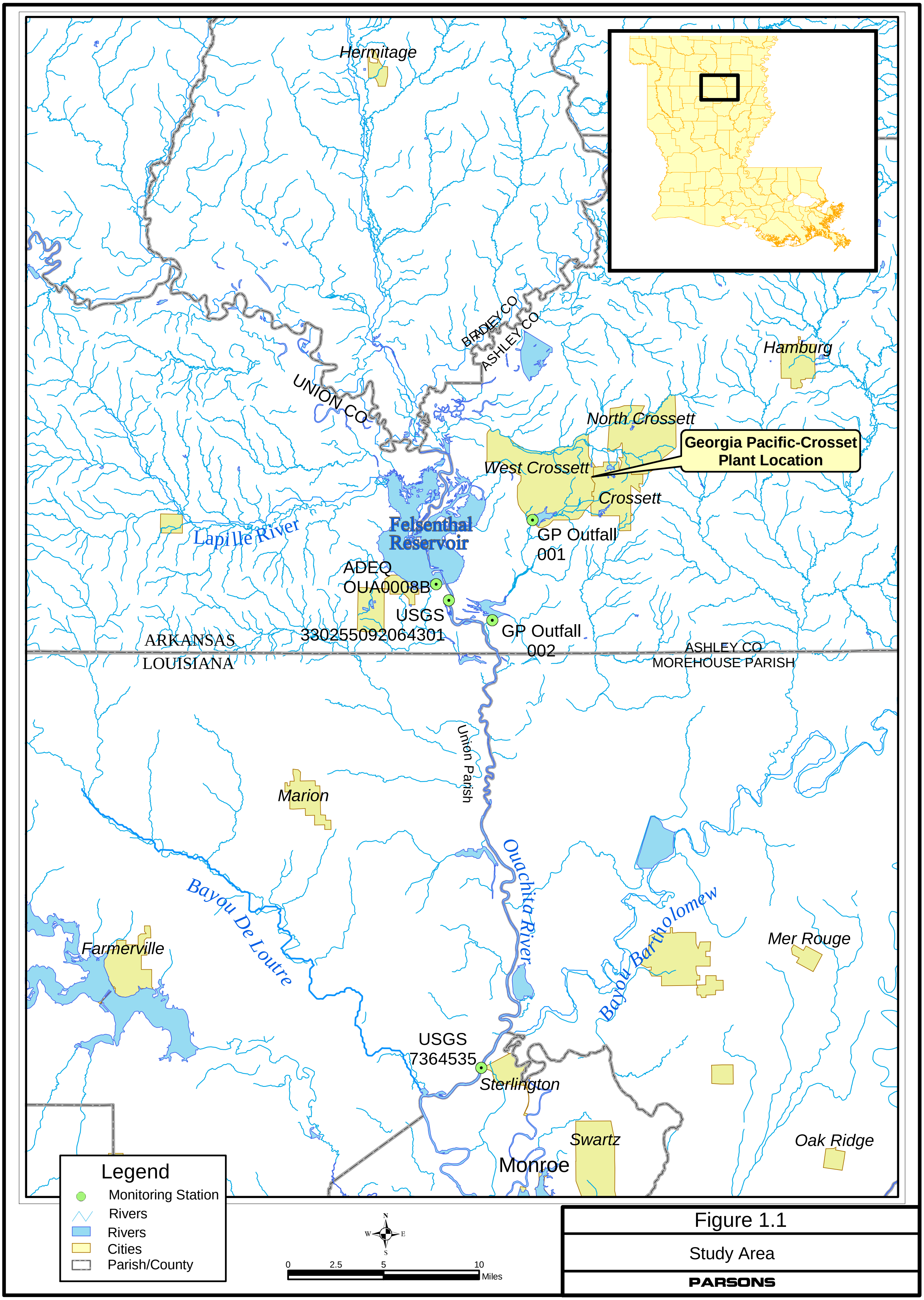

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Figure 1.1

Study Area

PARSONS

08040202). However the subwatersheds in Arkansas and Louisiana that drain directly to the portion of the Ouachita River relevant to this report only comprise a portion of the larger Ouachita-Bayou De Loutre River Basin. The Ouachita-Bayou De Loutre River Basin is approximately 825,000 acres, whereas the study area addressed in this report, which is the Ouachita River from Felsenthal Reservoir to Sterlington, LA including the Coffee Creek/Mossy Lake subwatershed, is approximately 230,000 acres.

Table 1.1 Ouachita-Bayou De Loutre River Basin Land Use Summary

LAND USE TYPE	ACRES	AREA
	8.18	0.01
Commercial and Services	958.10	1.50
Confined Feeding OPS	15.68	0.02
Cropland and Pasture	54,030.76	84.42
Deciduous Forest Land	94,317.17	147.37
Evergreen Forest Land	263,248.35	411.33
Forested Wetland	173,009.07	270.33
Industrial	2,376.73	3.72
Lakes	1,510.73	2.36
Mixed Forest Land	2,126,83.60	332.32
Mxd Urban or Built-Up	55.66	0.09
Nonforested Wetland	7,757.07	12.12
Other Urban or Built-up	239.62	0.37
Reservoirs	3,755.38	5.87
Residential	6,143.22	9.60
Streams and Canals	3,361.78	5.25
Strip Mines	358.14	0.56
Trans, Comm, Util	544.03	0.85
Transitional Areas	656.09	1.03
	825,029.34	1289.11

Source: USEPA BASINS Version 3

1.2 SEGMENT 2D OF THE OUACHITA RIVER IN ARKANSAS

The Ouachita River below Felsenthal Reservoir to the Louisiana state line, approximately 6 river miles, is the most downstream section of the Arkansas Department of Environmental Quality (ADEQ) Water Planning Segment 2D. Segment 2D of the Ouachita River basin occupies the south central part of Arkansas, covering all of Calhoun County, large portions of Bradley, Dallas, Ouachita, and Union Counties, and smaller areas of Ashley, Cleveland, Columbia, and Nevada Counties (ADEQ 2000). Segment 2D encompasses the lower Ouachita River and its tributaries from the confluence of the Little Missouri and Ouachita Rivers to the Louisiana state line. Major tributaries are Moro Creek, Lapile Creek, Champagnolle Creek, and Smackover Creek (ADEQ 2000).

Flow rate measurements at the U.S. Geological Survey (USGS) Station 07364080 at the Felsenthal Lock and Dam were primarily recorded during low flow months. The lowest monthly average flow rate over the period of record is 2,605 cubic feet per second (cfs), as shown on the USGS website (see Appendix A, Item 3), which occurs in September. The data are sporadic during high flow months, with March averaging 8,583 cfs using only three March monthly averages in 1967, 1971, and 1972.

1.2.1 Arkansas Water Quality Standards

Designated uses for Segment 2D are propagation of fish/wildlife, primary and secondary contact recreation, perennial Gulf Coast fishery, and public, industrial, and agriculture water supplies (ADEQ 2000). Tables 1.2 and 1.3 summarize the water quality standards for the pollutants listed in Chapter 5 of the Arkansas Administrative Code (ACC) Regulation 2.

Based on a Use Attainability Analysis (UAA) for the lower Ouachita River, ADEQ assigned a variation to ACC Regulation 2 for aquatic life use. It states at page A33:

"…from Ouachita River mile (ORM) 223 to the Arkansas-Louisiana border (ORM 221.1), site specific seasonal [dissolved oxygen] D.O. criteria: 3 mg/L June and July; 4.5 mg/L August; 5 mg/L September through May. These seasonal criteria may be unattainable during or following naturally occurring high flows (i.e., river stage above 65 feet measured at the lower gauge at the Felsenthal Lock and Dam, Station No.89-o, and also for the two weeks following the recession of flood waters below 65 feet), which occurs from May through August. Naturally occurring conditions which fail to meet criteria should not be interpreted as violations of these criteria (GC-3, #26)."

The Ouachita River from the Louisiana state line upstream to the Little Missouri River has a site-specific standard for maximum temperature of 89.6º Fahrenheit (F). The hardness value of 22.91 mg/L and a pH value of 6.84 used to calculate certain metals limits and Pentachlorophenol, respectively, are the average values listed in the ADEQ 2000 305(b) Report for Stream Station OUA08B (ADEQ 2000 page A-66). The ADEQ Draft 2002 303(d) List indicates fish consumption uses are not supported for the Ouachita River below Felsenthal Reservoir due to mercury contamination from an unknown source. These reports conclude that all other designated uses are supported for this part of the river in Arkansas. A discussion of the historical water quality of the Ouachita River is provided in Section 2.

All remaining water quality standards, such as the narrative criteria in Chapter 4 of ACC Regulations 2, apply to the Ouachita River. ADEQ's narrative criteria include taste and odor, color, toxic substances, oil and grease, nutrients, and foaming and frothing.

Table 1.2 Arkansas Water Quality Standards for the Ouachita River between Felsenthal Reservoir and the Louisiana State Line

Parameter	Limit	Unit or Measurement	Comment
Bacteria	200	CFU/100 ml	April - September, geometric mean with no more than 10% of samples > 400
Cl	160	mg/l	
Dissolved Oxygen	3	mg/l	June and July for Ouachita River Miles (ORM) 223 to ORM 221.1(Louisiana border)
	4.5	mg/l	August for ORM 223 - 221.1
	5	mg/l	September through May for ORM 223 - 221.1
	no limit	mg/l	river stage above 65 feet measured at Station No. 89-o (above Coffee Creek Confluence) and 2-weeks following flooding for ORM 223 - 221.1
	6.5	mg/l	March - May, Ouachita River above ORM 223 to Felsenthal Reservoir
	5	mg/l	June - February, Ouachita River above ORM 223 to Felsenthal Reservoir with water temperature ≤ 22 degrees C.
	4	mg/l	June - February, Ouachita River above ORM 223 to Felsenthal Reservoir with water temperature >22 degrees C, 8-hours maximum.
pH	6.0 - 9.0	SU	must not fluctuate in excess of 1.0 unit over a period of 24 hours
Radioactivity	3	pc/l	dissolved radium-226
	10	pc/l	dissolved strontium-90
.	1000	pc/l	gross beta concentration
SO_4	40	mg/l	
TDS	350	mg/l	
Temperature	32	^{o}C (89.6 F)	
Turbidity	21	NTU	

Table 1.3 Arkansas Numerical Criteria for Specific Toxic Substances

Toxic Substance (ug/l)	Aquatic Life Protection Freshwater		Human Health Protection Drinking Water Supply
	Acute	Chronic	
Pesticides and PCB's			
PCB's	--	0.014	0.4
Aldrin	3	--	--
Dieldrin	2.5	0.0019	1.2
DDT (& metabolites)	1.1	0.001	--
Endrin	0.18	0.0023	--
Toxaphene	0.73	0.0002	6.3
Chlordane	2.4	0.0043	5
Endosulfan[a]	0.22	0.056	--
Heptachlor	0.52	0.0038	--
Hexachlorocyclohexane	2[a]	0.08[a]	37.3[b]
Chloropyrifos	0.083	0.041	--
Acid – Extractable Organic Chemicals			
Pentachlorophenol (pH = 6.84)	7.72	4.9	--
Other Organics			
Dioxin (2,3,7,8 TCDD)			0.001
Metals and Inorganics			
Cadmium[c] (d)	0.75	0.35	--
Chromium, Trivalent[c] (d)	164.14	53.25	--
Chromium, Hexavalent (d)	15.71	10.56	--
Copper[c] (d)	4.25	3.23	--
Lead[c] (d)	12.58	0.49	--
Mercury, Total Recoverable[d]	2.04	0.012	--
Nickel[c] (d)	406.88	45.19	--
Selenium, Total Recoverable	20	5	--
Silver[c] (d)	0.27357	--	--
Zinc[c] (d)	32.84	29.98	--
Cyanide, Total Recoverable	22.36	5.2	--
Beryllium	--	--	76

[a] Total of all isomers
[b] Human health standard is for α–hexachlorocyclohexane
[c] Metals concentration calculated based on total hardness of 22.91
[d] Mercury based on bioaccumulation
(d) dissolved concentration
(e) See ADEQ 2000 305(b) Report

ADEQ Regulation §2.406 limits the amount of color a wastewater treatment plant can discharge to waters of the state. Pulp and paper mills are known to generate tannins, humic acid, and humates that can alter the color of the receiving water. In addition to largely aesthetic concerns, color alteration can also limit light penetration which can have a detrimental impact on primary production and aquatic life. Both the States of Arkansas and Louisiana require that the color of a water body shall not be increased to the extent that present or future uses of the water are impaired. The U.S. Environmental Protection Agency's (USEPA) National Secondary Drinking Water Standards limits the maximum contaminants level for potable water to 15 color units.

1.2.2 Coffee Creek and Mossy Lake

The confluence of the Ouachita River and Coffee Creek is a short distance downstream of ORM 223. ADEQ Regulation 2 (page A33) states Coffee Creek and Mossy Lake are exempt from §2.406 and Chapter 5 due to findings in a UAA. The ADEQ also determined through UAA that Coffee Creek and Mossy Lake have no fishable, swimmable, or domestic water supply uses. Based on the administratively continued Georgia Pacific – Crossett wastewater discharge permit, the ADEQ considers all waters above Outfall 002 into Mossy Lake to be part of the paper mill's treatment system. The only designated use is industrial water supply. Mossy Lake and Coffee Creek will be discussed in more detail in Section 3.

1.3 SEGMENT 080101 OF THE OUACHITA RIVER

Segment 080101 of the Ouachita River begins at the Arkansas-Louisiana state line, then travels 102 miles to the Columbia Lock and Dam. The Louisiana segment of the Ouachita River addressed in this report starts at the Arkansas-Louisiana state line and proceeds approximately 25 miles downstream to Sterlington, Louisiana.

The Ouachita River is designated a "Scenic River" from the state line to the north bank of Bartholomew Bayou (22 miles). Bartholomew Bayou is approximately 2.5 miles upstream of Highway 2 in Sterlington. The term "Scenic River" was adopted by the State of Louisiana in the early 1970s as part of state legislation prohibiting certain activities within 100 feet of a designated water body. Louisiana's "Scenic River" legislation and rules are independent of any federal regulation or waterbody designations, such as "Outstanding Natural Resource" waters, as used by EPA and defined in the Clean Water Act.

1.3.1 Louisiana Water Quality Standards

Designated uses, narrative, and numeric criteria that apply to this reach of the Ouachita River are derived from the Louisiana Environmental Regulatory Code, Title 33, Chapter 11. Designated uses are primary and secondary recreation, fish and wildlife propagation, and drinking water supply designated uses. According to the Louisiana Department of Environmental Quality's (LDEQ) 2000 draft §305(b) report, all uses are fully supported except fish and wildlife propagation. Suspected causes of fish and wildlife impairment are:

- Cadmium
- Copper

- Lead
- Mercury
- Metals
- Organic enrichment / low DO

Suspected sources of the above contaminates are atmospheric deposition, agriculture, hydro-modification, and natural and unknown sources. The Louisiana Draft 2002 §303(d) List identifies Segment 080101 as not meeting primary contact recreation use as a result of high levels of bacteria.

The water quality criteria for DO for Segment 080101 of the Ouachita River are 3.0 mg/L for June and July, 4.5 mg/L for August, and 5.0 mg/L for September through May. Tables 1.4 and 1.5 provide the numeric water quality standards for Segment 080101 of the Ouachita River. Each major category of narrative and numeric criteria is addressed in Section 2.

Table 1.4 Louisiana Water Quality Standards for the Ouachita River Arkansas State Line to Columbia Lock and Dam

Parameter	Limit	Unit or Measurement	Comment
Bacteria	200	CFU/100 ml	May - October, mean with no more than 10% of samples > 400
Cl	160	mg/l	
Dissolved Oxygen	3	mg/l	June and July
	4.5	mg/l	August
	5	mg/l	September through May
	no limit		river stage above 65 feet measured at the Felsenthal Dam and 2-weeks following flooding
pH	6.0-8.5	SU	
Radioactivity			Must not exceed levels established pursuant to Federal Safe Drinking Water Act
SO_4	35	mg/l	
TDS	350	mg/l	
Temperature	33	^oC	
Turbidity	50	NTU	

Table 1.5 Louisiana Numerical Criteria for Specific Toxic Substances

(In micrograms per liter (ug/L) or parts per billion (ppb) unless designated otherwise)

Toxic Substance	Aquatic Life Protection Freshwater		Human Health Protection Drinking Water Supply
	Acute	Chronic	
Pesticides and PCB's			
Aldrin	3	--	0.04 ng/l
Chlordane	2.4	0.0043	0.19 ng/l
DDT	1.1	0.001	0.19 ng/l
TDE (DDD)	0.03	0.006	0.27 ng/l
DDE	52.5	10.5	0.19 ng/l
Dieldrin	0.2374	0.0557	0.05 ng/l
Endosulfan	0.22	0.056	0.47
Endrin	0.0864	0.0375	0.26
Heptachlor	0.52	0.0038	0.07 ng/l
Hexachlorocyclohexane (gamma BHC, Lindane)	5.3	0.21	0.11
Polychlorinated Biphenyls, Total (PCB's)	2	0.014	0.01 ng/l
Toxaphene	0.73	0.0002	0.24 ng/l
2,4-Dichlorophenoxyacetic acid (2,4-D)	--	--	100
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP;Silvex)	--	--	10
Volatile Organic Chemicals			
Benzene	2,249	1,125	1.1
Carbon Tetrachloride (Tetrachloromethane)	2,730	1,365	0.22
Chloroform (Trichloromethane)	2,890	1,445	5.3
Ethylbenzene	3,200	1,600	2.39 mg/l
1,2-Dichloroethane (EDC)	11,800	5,900	0.36
1,1,1-Trichloroethane	5,280	2,640	200
1,1,2-Trichloroethane	1,800	900	0.56
1,1,2,2-Tetrachloroethane	932	466	0.16
1,1-Dichloroethylene	1,160	580	0.05
Trichloroethylene	3,900	1,950	2.8
Tetrachloroethylene	1,290	645	0.65
Toluene	1,270	635	6.1 mg/l
Vinyl Chloride (Chloroethylene)	--	--	1.9
Bromoform (Tribromomethane)	2,930	1,465	3.9
Bromodichloromethane	--	--	0.2
Acid – Extractable Organic Chemicals			
Methylene chloride (Dichloromethane)	19,300	9,650	4.4
Methyl chloride (Chloromethane)	55,000	27,500	--
Dibromochloromethane	--	--	0.39
1,-3-Dichloropropene	606	303	9.86
2-Chlorophenol	258	129	0.1
3-Chlorophenol	--	--	0.1
4-Chlorophenol	383	192	0.1
2,3-Dichlorophenol	--	--	0.04
2,4-Dichlorophenol	202	101	0.3
2,5-Dichlorophenol	--	--	0.5
2,6-Dichlorophenol	--	--	0.2
3,4-Dichlorophenol	--	--	0.3
Phenol (Total)5	700	350	5
Base/Neutral Extractable Organic Chemicals			
Benzidine	250	125	0.08 ng/l
Hexachlorobenzene	--	--	0.25 ng/l
Hexachlorobutadiene6	5.1	1.02	0.09
Other Organics			
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	--	--	0.71 ppq
Metals and Inorganics			
Arsenic	339.8	150	50
Chromium III (Tri)[a] (d)	256	83.12	50
Chromium VI (Hex)	16	11	50
Zinc[a] (d)	52.05	47.53	5.0 mg/L
Cadmium[a] (d)	13.16	0.52	10
Copper[a] (d)	7.67	5.55	1.0 mg/L
Lead[a] (d)	23.16	0.90	50
Mercury (d)	2.04	0.012	2
Nickel[a] (d)	644.51	71.58	--
Cyanide	45.9	5.4	663.8

[a] Metals concentration calculated using the total hardness (39.46) of the Ouachita River At Sterlington, LA

(d) dissolved concentration

SECTION 2
COMPARISON OF HISTORICAL WATER QUALITY DATA WITH APPLICABLE WATER QUALITY STANDARDS

2.1 PURPOSE

This section provides a summary evaluation of water quality in the Ouachita River below Felsenthal Reservoir by comparing available historical data to the Arkansas and Louisiana state water quality standards.

2.2 NARRATIVE CRITERIA

2.2.1 Aesthetics, Color, and Turbidity

Both Arkansas and Louisiana water quality standards have general criteria for regulating the aesthetic quality, color, and turbidity of surface waters. The Regulation Establishing Water Quality Standards for Surface Water of the State of Arkansas, Section 2.406, states, “True color shall not be increased in any waters to the extent that it will interfere with present or projected future uses of these waters.” Section 2.503 states, “There shall be no distinctly visible increase in turbidity of receiving waters attributable to municipal, industrial, agricultural, other waste discharges or instream activities.” The regulations also establish a numerical nephelometric turbidity unit (NTU) limit of 21 for typical gulf coastal waterbodies.

Louisiana’s Title 33 – Environmental Regulatory Code, Section 1113, (B) General Criteria, states,

“1. Aesthetics,

“The waters of the state shall be maintained in an aesthetically attractive condition and shall meet the generally accepted aesthetic qualifications. All waters shall be free from such concentrations of substances attributable to wastewater or other discharges sufficient to:

“a. settle to form objectionable deposits;

“b. float as debris, scum, oil, or other matter to form nuisances or to negatively impact the aesthetics;

“c. result in objectionable color, odor, taste, or turbidity;

“d. injure, be toxic, or produce demonstrated adverse physiological or behavioral responses in humans, animals, fish, shellfish, wildlife, or plants; or

“e. Produce undesirable or nuisance aquatic life.

"2. Color. Water color shall not be increased to the extent that it will interfere with present usage or projected future use of the state's waterbodies.

"a. Waters shall be free from significant increases over natural background color levels.

"b. A source of drinking water supply shall not exceed 75 color units on the platinum-cobalt scale.

"c. No increases in true or apparent color shall reduce the level of light penetration below that required by desirable indigenous species of aquatic life."

Pulp and paper mills are known to generate tannins, humic acid, and humates that can significantly increase the color of the receiving water. In addition to largely aesthetic concerns, increased color can also limit light penetration and thereby detrimentally impact primary production and aquatic life. No negative affects on aquatic species due to color immediately downstream of Coffee Creek was found in the literature reviewed.

The following Tables 2.1 through 2.5 provide color data collected on the Ouachita River upstream and downstream of its confluence with Coffee Creek between June 1998 and September 1998 (AquAeTer 1999). While it is uncertain what unit of measure was used to assess color in this study, a definite trend can be discerned from these tables. The color in the Ouachita River, downstream of Coffee Creek, increases regardless of the sampling event. However, it is uncertain as to whether the color alteration of Coffee Creek is primarily caused by the effluent from the Georgia Pacific mill or natural alterations in water color caused by wetlands in the Coffee Creek, Mossy Lake subwatershed.

Turbidity must be removed to measure true color. Apparent color, which is different than true color, is visually determined by comparing the sample to various standard colors. Color units presented in Tables 2.1 through 2.5 are based on the platinum-cobalt scale color units.

Table 2.1 Ouachita River June 25, 1998 Water Quality Data Run of the River Sampling

Sample Loc. ORM	Color*	Secci Depth feet	Time
239.1	12	2.9	1030
234	17	2.8	1040
229	21	2.4	1055
224	21	2.6	1110
Coffee C.	742	0.4	1120
218.7	45	2.0	1130
213.5	41	1.8	1145
208.8	41	1.8	1205
203	35	1.7	1220
198	42	1.8	1235
194	37	1.7	1250
190.2	35	1.7	1310
Ouachita Flow (cfs)		1040	
Mossy Flow		32.6 MGD	
Mossy BOD		3,316 lbs (latest BOD)	
Trip Date		25-Jun-02	

* Platinum-cobalt units.

Source: AquAeTer, 1999

Table 2.2 Ouachita River July 21, 1998 Water Quality Data Run of the River Sampling

ORM	Color*	Secci Depth feet	Time	Water Conditions	Weather Conditions
239.1	14	2.7	1000	Murky Green	Clear
234	20	2.8	1014	Murky Green	Clear
229	20	3.0	1025	Murky Green	Clear
224	17	2.8	1100	Murky Green	Clear
Coffee C.	457	2.9	1105	Dark	Clear
218.7	35	2.3	1115	Murky Green	Clear
213.5	40	1.9	1125	Murky Green	Clear
208.8	43	1.9	1135	Murky Green	Clear
203	30	1.9	1150	Murky Green	Clear
198	58	1.9	1205	Murky Green	Partly Cloud
194	44	1.9	1215	Murky Green	Partly Cloud
190.2	32	1.9	1230	Murky Green	Partly Cloud
Ouachita Flow (cfs)		16 Jul (1176)	17 Jul (900)	20 Jul (1150)	21 Jul (1378)
Mossy Flow	65.3 MGD				
Mossy BOD	3147 lbs (latest BOD)				
Trip Date	21-Jul-98				

* Platinum-cobalt units.

Source: AquAeTer, 1999

Table 2.3 Ouachita River August 5, 1998 Water Quality Data Upstream and Downstream of Coffee Creek Confluence (ORM 222)

ORM	Color*	Time	Water Conditions	Weather Conditions
224	9	900	murky green	overcast
224	9	1255	murky green	sunny
224	9	1600	murky green	sunny
224	8	2230	murky green	rain
224	11	600	murky green	overcast
208.8	31	930	murky brown	ptly sunny
208.8	31	1220	murky brown	sunny
208.8	30	1630	murky brown	sunny
208.8	34	1900	murky brown	overcast
208.8	38	200	murky brown	overcast
208.8	35	500	murky brown	overcast
Ouachita Flow (cfs)	31 Jul (986)	3 Aug (1730)	4 Aug (760)	5 Aug (737)
Mossy Flow		40.0 MGD		
Mossy BOD		2072 lbs. (30 Jul 98)		
Trip Date		5-Aug-98		

* Platinum-cobalt units.

Source: AquAeTer, 1999

Table 2.4 Ouachita River August 27, 1998 Water Quality Data

ORM	Color*	Secci Depth	Time	Water Conditions	Weather Conditions
239.1	10	2.72	1000	Murky Green	Clear
234	13	2.83	1005	Murky Green	Clear
229	15	3.04	1017	Murky Green	Clear
224	20	2.83	1050	Murky Green	Clear
Coffee Ck	1,116	2.92	1105		Clear
218.7	74	2.27	1110	Dark Brown	Clear
213.5	75	1.90	1125	Brown	Clear
208.8	30	1.90	1135	Green/Brown	Clear
203	30	1.90	1150	Green	Clear
198	30	1.88	1205	Green	Partly Cloudy
194	28	1.85	1215	Green	Partly Cloudy
190.2	19	1.98	1225	Black	Partly Cloudy
Ouachita Flow (cfs)	21 Aug (1092)	24 Aug (874)	25 Aug (1008)	26 Aug (942)	27 Aug (881)
Mossy Flow		27.6 MGD			
Mossy BOD		2072 lbs. (30 Jul 98)			
Trip Date			5-Aug-98		

* Platinum-cobalt units.

Source: AquAeTer, 1999

Table 2.5 Ouachita River September 18, 1998 Water Quality Data Run of the River

ORM	Color*	Secci Depth	Time	Water Conditions	Weather Conditions
239.1	27	1.42	1012	Muddy Brown	Clear
234	35	1.58	1023	Brown/Green	Clear
229	30	1.75	1038	Murky Green	Clear
224	32	1.58	1105	Murky Green	Clear
Coffee Ck	830		1123	Black	Clear
218.7	56	1.50	1135	Murky Green	Clear
213.5	42	1.50	1145	Murky Green	Clear
208.8	42	1.50	1157	Murky Green	Clear
203	44	1.53	1211	Murky Green	Clear
198	44	1.58	1223	Murky Green	Clear
194	43	1.58	1233	Murky Green	Clear
190.2	48	1.58	1245	Murky Green	Clear
Ouachita Flow (cfs)	14 Sep (2190)	15 Sep (2305)	16 Sep (2671)	17 Sep (3536)	18 Sep (5268)
Mossy Flow		56.1 MGD			
Mossy BOD		2948 lbs. (latest BOD)			
Trip Date		18-Sep-98			

* Platinum-cobalt units.

Source: AquAeTer, 1999

Turbidity was measured at 19 sampling stations on the lower Ouachita River (Arkansas) from September 1992 through September 1993. Turbidity levels from sampling stations below Lake Catherine to the Arkansas-Louisiana border increases as the water flows downstream (FTN Associates [FTN] 1996). Table 2.6 lists turbidity measurements from above Coffee Creek (Station 8A in the FTN report) and below Coffee Creek (Station 8B). Additional data collected in July 1994 were significantly higher, both above (51 NTUs) and below (56 NTUs) Coffee Creek (FTN 1996). The July 1994 sampling event recorded the turbidity in Coffee Creek at the confluence with the Ouachita River was 36 NTUs (FTN 1996).

Table 2.6 Ouachita River Turbidity September 1992 – September 1993

Station	Minimum (NTU)	Median (NTU)	Maximum (NTU)	Number of Samples
8A	5	15	30	11
8B	6	11	39	11

2.2.2 Biological and Aquatic Community Integrity

A number of fish surveys have been performed in both states. In 1975, 48 fish species were found downstream of the Coffee Creek confluence and upstream of the Arkansas-Louisiana border (Raymond 1975). In 1984, 22 fish species were found in the same areas (Baker 1984). It should be noted that the Felsenthal Reservoir was impounded in Fall 1984 (Lower Ouachita River Working Group [LORWG] 1993). Therefore, construction of the impoundment upstream of Coffee Creek may have caused the reduction in fish species. In 1991, the LORWG found 22 fish species below Coffee Creek. In 1992, the LORWG found 37 fish species. The LORWG (1993) summary of the 1991 and 1992 fish surveys states the following:

"In the lower reaches of the river, particularly below Reach #4, fish community impairments are also indicated. The causes may be hydrology related too, but the apparent spatial fluctuations in the fish community indicate point source impacts, either single source or cumulative, particularly near West Two Bayou and Smackover Creek. Although not apparent from the current data, heavy siltation from nonpoint sources and dredging for navigation channel maintenance may also be causing adverse impacts."

According to the USACE's Vicksburg District, Navigation Bulletin 1502, dredging occurred downstream of the new lock and dam to an unknown distance downstream in April and May 2002 (see Appendix A, Item no. 8). Dredging has a major impact on benthic organisms and benthic feeding fish species, such as suckers. Both the LORWG (1993) and AquAeTer (1993) found low species number and abundance of benthic organisms and suckers (*Catostomidae*) both upstream and downstream of Coffee Creek. In many water bodies, habitat degradation is responsible for more ecological impairment than chemical pollution. Nevertheless, aquatic life habitat remediation cannot substitute for chemical remediation in addressing human health risks (Rogers 2002). Greater flooding and a corresponding lower DO in 1991 than in 1992 may explain the difference in the fish species count for those 2 years (AquAeTer 1999).

In July 1992, Georgia-Pacific, in cooperation with the Arkansas Game and Fish Commission and the Arkansas Department of Pollution Control and Ecology conducted a fish study with primary emphasis on the large-mouth bass (LMB). In all, seven LMBs were collected upstream of Coffee Creek and 17 LMBs were collected downstream. A power fit regression analysis of the fish data was used to determine the relationship between length to weight. Although there were no apparent differences in the health of the LMBs, both upstream and downstream of Coffee Creek, the statistical analysis indicated the downstream fish were heavier per comparative lengths than the upstream fish (AquAeTer 1999).

The LORWG describes the 6 miles of the Ouachita River between the Felsenthal Dam and the state line as having a flat gradient (<0.5 feet/mile), steep cut sandy banks, deep channel, and no riffle areas, as well as a heavy sediment load and a bottom characterized as shifting sand and silt (LORWG 1993). From this general information it can be surmised that the aquatic habitat of the Ouachita River from Felsenthal Reservoir to Sterlington, LA has been altered and is marginal at best. However, there is insufficient data to adequately characterize the benthic and fish community of the Ouachita River. Additional data would be necessary including reference site comparisons to fully assess the biological integrity of the River.

2.2.3 Floating, Suspended, and Settleable Solids

A number of activities maybe causing or contributing to the concerns identified related to total suspended solids. The 2000 modified court-ordered Louisiana 303(d) list indicates suspended solids from irrigated crop production are affecting designated uses. Irrigation overflows from an 11,000 acre agricultural row crop operation located in Morehouse parish maybe a significant nonpoint source pollution source of sediments. While barge traffic on the Ouachita River is light through this segment periodic dredging has had an impact on the sediment budget and transport. According to the January 9, 2000 edition of *The Washington Post*, “So far, there has never been a barge at the Port of Camden; the Port of Crossett downriver has docked only one (Grunwald 2000).”

Secci disc measurements are valuable in assessing turbidity and suspended and settleable solids. A secci disc is a flat 8” circular plate painted black and white in alternating quadrants. The disc is lowered to a depth to where it can no longer be seen, then raised to a depth where it can be seen again. The depths are averaged. The average depth may be normalized by adjusting for sunlight intensity. Tables 2.1, 2.2, 2.4, and 2.5 above suggest light penetration is poor. Suspended sediment caused by nonpoint sources and dredging (LORWG 1993) should be addressed in future sampling efforts.

2.2.4 Taste and Odor

No taste and odor data were found during preparation of this report; however, odor in an area downstream of Coffee Creek has been reported (Cooksey 2002). Effluent from the Georgia Pacific mill combined with the natural odor from wetlands maybe the source of the odor concern. Further investigation is necessary to determine the validity and severity of the odor concern.

2.2.5 Toxic Substances

Ambient toxicity screening of the Lower Ouachita River was performed from August 1992 to December 1994 by the Ouachita Baptist University and LORWG. Although the raw data were not available to Parsons, the LORWG summary report indicated there was little to no ambient toxicity in the main stem of the Ouachita River. Toxicity was found in tributaries to the Ouachita River upstream of Felsenthal Reservoir. The LORWG summary report also indicted toxicity found in the tributaries may not result in toxicity in the river. Although the summary did not indicate the location of sampling, there was no mention of toxicity in or near Coffee Creek. However, self-reporting data for Georgia-Pacific indicate persistent sublethal toxic effects to surrogate species in Coffee Creek downstream of its aerated lagoon. This will be discussed in more detail in Section 3.

Sediment samples were collected from Coffee Creek in 1993 by Arkansas State University. Results of the sediment toxicity tests with *C. tentans* showed statistically significant differences in reduced growth (LORWG 1996). From the existing data set it is difficult to draw any substantive conclusions regarding ambient toxicity in the Ouachita River. Additional sampling would be necessary to assess this narrative criteria.

2.2.6 Foaming and Frothing Materials

The March 14, 2002 letter from Representative John Cooksey referred to a witness who said, "When boats ran across the wastewater, a foam-like substance which looked somewhat like soap suds appeared on the surface of the water." (Cooksey 2002). No other reference to foaming was found in the literature reviewed.

2.2.7 Nutrients

The Arkansas state water quality standards (ASWQS) provide a not-to-exceed guideline of 0.10 mg/L total phosphorus in rivers with clear water. The ASWQS do not provide limits or guidelines for the other nutrient parameters. The Secci dish measurements discussed in subsection 2.2.1 suggest high turbidity levels, which can decrease light penetration and may, therefore, limit algae growth in Coffee Creek and Ouachita River.

Nitrate-nitrogen concentrations below Coffee Creek ranged from 0.07 mg/L to 0.28 mg/L with 75 percent of the data collected from September 1992 to September 1993 below 0.2 mg/L. The total Kjedahl nitrogen concentrations above and below Coffee Creek were essentially the same during the same period and ranged from 0.4 to 0.8 mg/L. There was a slight increase in total phosphorus downstream of Coffee Creek during this period. Total phosphorus ranged from 0.022 mg/L to 0.055 mg/L upstream and 0.021 mg/L to 0.07 mg/L downstream of Coffee Creek (FTN 1996).

Water samples collected above and below Coffee Creek on July 20 – 21, 1994 contained ammonia-nitrogen concentrations 0.05 mg/L and 0.06 mg/L, respectively.

During the same period, samples from Coffee Creek at the confluence with the Ouachita River contained 1.19 mg/L of ammonia-nitrogen (FTN 1996).

The USEPA and ADEQ are considering monitoring requirements or permit limits for total nitrogen and total phosphorus in the next Georgia-Pacific permit (Mustafa 2001 and Tillman 2001). More nutrient data are needed to adequately assess this narrative water quality standard in the Ouachita River.

2.3 NUMERIC CRITERIA

2.3.1 pH

The ASWQS prescribe, "As a result of waste discharges, the pH of water in streams or lakes must not fluctuate in excess of 1.0 unit over a period of 24 hours and pH values shall not be below 6.0 or above 9.0" (ADEQ 2002). During the period from September 1992 through September 1993 pH was measured 9 times upstream and downstream of Coffee Creek. One pH water sample value of 6.0 standard unit (s.u.) was recorded upstream, and two pH values of 5.6 s.u. and 5.7 s.u. downstream of Coffee Creek. The low pH values were not limited to below Coffee Creek. In all, 13 out of 119 water samples collected upstream of Felsenthal Reservoir during this period had pH values below 6.0. The low pH values are not unexpected given low concentrations of alkalinity, cations, and anions in Ouachita River (FTN 1996). The LDEQ pH standard is 6.0 to 8.5.

On June 25, July 21, and August 27, 1998, Georgia-Pacific collected pH data from Coffee Creek and 11 stations from ORM 239.1 (below Saline River) to ORM 190.2 (below Sterlington, LA). All pH values were between 6.0 and 9.0.

USGS Station 7364535 (LDEQ Station 0013 at Sterlington) recorded 119 pH measurements between January 1992 through December 2001. Thirteen (11 percent) pH measurements fell below the 6.0 standard and primarily occurred in January through April. Parsons recommends collection of additional pH data during this period.

2.3.2 Chlorides, Sulfates, and Total Dissolved Solids

The ASWQS for chlorides, sulfates, and total dissolved solids (TDS) are 160 mg/L, 40 mg/L and 350 mg/L, respectively. The Louisiana Surface Water Quality Standards (LSWQS) for chlorides, sulfates, and TDSs are 160 mg/L, 35 mg/L and 350 mg/L, respectively.

Chloride measurements from September 1992 through September 1993 ranged from approximately 7 mg/L to 28 mg/L above Coffee Creek, and approximately 7 mg/L to 30 mg/L below Coffee Creek. A sample collected July 20-21, 1994 from Coffee Creek at the confluence of the Ouachita River contained 26.3 mg/L of chloride (FTN 1996). Chloride concentrations were measured at USGS Station 7364535 (Sterlington, LA) from January 1992 to December 2001 (Appendix A, Item 3). Chlorides concentrations averaged 18 mg/L over this period with a maximum detection of 70 mg/L (Appendix A, Item 3). All these values are well below the 160 mg/L stream standard for both Arkansas and Louisiana.

Sulfates concentrations above and below Coffee Creek were similar from September 1992 through September 1993 with values ranging from approximately 6 mg/L to 13 mg/L. A sample collected July 20-21, 1994 from Coffee Creek at the confluence of the Ouachita River contained 20.7 mg/L of chloride (FTN 1996). At USGS Station 7364535, the sulfate concentrations of 119 samples collected from 1992 through 2001 averaged 13 mg/L with a maximum of 45 mg/L (Appendix A, Item 3). There were two sulfate detections above the LSWQS maximum of 35 mg/L during this period. However, sulfate does not appear to be a water quality concern.

TDS measurements were reported from water samples collected at Station OUA0008B (upstream of Coffee Creek) and USGS Station 7364535 (Sterlington, LA). TDS averaged 80.2 mg/L with a maximum detection of 132 mg/L at Station OUA0008B from August 1993 through May 2002. TDS averaged 129 mg/L with a maximum detection of 1,419 mg/L (two measurements above 350 mg/L) at USGS Station in Sterlington, LA. These data do not indicate a TDS water quality concern at these two stations. Additional TDS monitoring between these two stations is recommended.

Data on the concentration of TDS in Coffee Creek were not available; however, USEPA could require TDS monitoring in the next Georgia-Pacific permit due to elevated metal salts in the discharge (Tillman 2001).

2.3.3 Dissolved Oxygen

In a typical year, Ouachita River below Felsenthal Reservoir is out of its banks 50 percent of the time due to flooding. At a floodstage of 65-feet above the National Geodetic Vertical Datum of 1929 (NGVD) the flood-inundated area below the dam and above Sterlington, LA can cover 17,500 acres. At 85-feet NGVD, the inundated area could encompass 90,000 acres. Much of the flooded area contains organic material from forest litter, which can cause depressed DO (AquAeTer 1993, 1996).

Both states' surface water quality standards for DO recognize these phenomena and are the same for this segment of the river. The ADEQ and LDEQ regulations provide the following site-specific, seasonal DO criteria: 3 mg/L June and July; 4.5 mg/L August; and 5 mg/L September through May. Surface water quality standards for both states also include, "*These seasonal criteria may be unattainable during or following naturally occurring high flows, (i.e., river stage above 65 feet measured at the lower gauge at the Felsenthal Lock and Dam and also for the 2 weeks following the recession of flood waters below 65 feet), which occurs from May through August. Naturally occurring conditions which fail to meet criteria should not be interpreted as violations of these criteria*."

Both the ADEQ and LDEQ have and are currently updating DO concentration simulation models. The models are used to determine the appropriate discharge limits for point source discharges to ensure the dissolved oxygen criteria is met in both states.

In general, DO conditions have improved in the River since the USACE began releasing water over the top of the hinge crest gates at Felsenthal Lock and Dam in 1996 (AquAeTer 1999). Unfortunately, there is very little DO data for every month of the year so there is an inadequate picture of the seasonal and diurnal DO cycle. Most DO data, since 1996, were collected from June through November.

Recent DO data from ADEQ Station OUA0008B and USGS Station 330255092064301, both below Felsenthal Reservoir and above Coffee Creek did not indicate a DO deficiency. Grab DO measurements are recorded at USGS Station 7364535 in Sterlington, Louisiana. Four out of five measurements from April 1997 through April 2001 and two out of four measurements from May 1998 through May 2001 indicated DO concentrations in the river were below the 5 mg/l standard. See Table 2.12 at the end of this Section. These nine DO data suggest there is a consistent DO deficiency in April and May at this station, but more data, rainfall, and flooding information is needed. A TMDL Report titled *Ouachita River TMDL For Biochemical Oxygen-Demanding Substances And Nutrients, Subsegment 080101, Surveyed 07/17/2001 – 07/19/2001* issued in April 2002 by the LDEQ indicated an intensive DO survey was scheduled for the Ouachita River basin in 2004. The report recommends a minimum of 12 samples per year. Parsons recommends a more robust sampling approach for DO both above and below Coffee Creek.

2.3.4 Temperature

The maximum temperature standard for this section of the Ouachita River is 89.6 ºF in Arkansas and 91.4 ºF in Louisiana. In addition, the maximum differential cannot be more than 5 ºF.

The water temperature upstream and downstream of Coffee Creek from September 1992 to September 1993 was essentially the same. The maximum temperature above and below Coffee Creek was a few tenths of a ºF above 86. The maximum differential between the two sampling points was also within a few tenths of a ºF (FTN 1996). Routine sampling for temperature should be continued, but no additional temperature sampling is warranted at this time.

2.3.5 Bacteria

No contact recreation use impairment is identified in Arkansas between Felsenthal Reservoir and the state line. However, there is not enough bacteria data to determine whether the water body is impaired based on the geometric mean of 5 samples in a 30-day period as defined in the ASWQS. The water quality standards for primary contact recreation require that the geometric mean of all counts performed in a 30-day period be less than 200 and that less than 10 percent of the samples exceed 400. Parsons recommends testing for bacteria downstream of Coffee Creek since the Georgia-Pacific discharge contains domestic wastewater. See Section 3 for a discussion about the domestic wastewater discharge from Crossett, Arkansas.

The Louisiana primary contact recreation standards are only in effect May 1 through October 31 of each year, with secondary contact recreation standards applying for the rest of the year. The secondary contact recreation standards are similar to the primary contact recreation standards, except the secondary standards require on total coliform counts, and the limits are 1,000 and 2,000, respectively. The Louisiana draft 2002 303(d) list identifies Segment 080101 as not meeting primary contact recreation uses as a result of high levels of bacteria.

Fecal coliform counts were performed monthly for the entire period of record. Total coliform counts were performed monthly from August 1992 until March 1996. Since only one sample was collected per month it is not possible to calculate a geometric mean, and any count above 400 (or 2,000) would appear to violate the 10 percent in 30 days rule. Therefore, the bacteria data should be regarded as screening data that serve to indicate whether more sampling is warranted. During the period of record, 14 of 118 (12 percent) fecal coliform counts exceeded 200, while nine (8 percent) of the counts exceeded 400. There was no obvious pattern to the temporal distribution of these "exceedances;" the distribution appeared random with respect to both the month and the year of measurement. More intensive sampling efforts (for fecal coliforms analysis in May 1 through October 31, and total coliform analysis in November 1 through April 30) are required to determine whether this water body is in compliance with the bacteria standards. Additional bacteria data should be collected in compliance with the methods prescribed in the LSWQS on an annual basis.

2.3.6 Toxic Substances

2.3.6.1 Pesticides and PCBs

Both Arkansas and Louisiana have surface water quality standards for pesticides and polychlorinated biphenyls (PCB) in the water column, see Tables 1.2 and 1.4. No recent pesticide or PCB ambient water quality data have been received, but, sediment and fish tissue data were reviewed. However, pesticides and PCB in sediment and fish tissue are not addressed in the water quality standards of the two states.

Six sediment samples were collected below Felsenthal Reservoir just upstream and downstream of Coffee Creek in April 1993. The samples were analyzed for aldrin, dieldrin, lindane, heptachlor, and DDT. The graphed results in the FTN (1996) report did not adequately identify which of the two sampling stations had detections. Aldrin was detected in three of the six samples in concentrations of approximately 0.02, 0.01, and 0.01 μg/g. Dieldrin was detected once at approximately 0.08 μg/g. Heptachlor was detected at approximately 0.01 μg/g in one of the six samples. Lindane and DDT were not detected in any of the six sediment samples (FTN 1996).

In 1992, the U.S. Fish and Wildlife Service (USF&WS) published the Upper Ouachita Wildlife Refuge Contamination Study, 1989 – 1990. The refuge is located in the mid-upper part of Louisiana. Fish tissue and sediment samples were collected in 1989 and analyzed for organochlorine pesticides, heavy metals, and dioxin. Analysis for polycyclic aromatic hydrocarbons (PAH) were also performed on the sediment samples. Additional analyses for dioxin were performed on fish tissue collected in 1990. Fish and/or sediment were collected at nine sites. Table 2.7 identifies the sites, the date samples were collected, and what was sampled (USF&WS 1992).

Table 2.7 Upper Ouachita Wildlife Refuge Contamination Study

Site	Name	Location	Date	Sampled
1	Mossy Lake, AR	T19S, 49W Section 19	9/10/89 5/24/89	Fish Sediment
1a	Felsenthal Lake Tailwaters, AR	T19S, R10W Section 22	5/25/90	Fish
1b	Coffee Creek Confluence, AR	T19S, R9W Section 30	7/25/90	Fish
2	Fish Lake, LA	T23N, R4E Section 17	8/10/89 5/24/89 7/26/90	Fish Sediment Fish
3	Mallard Lake, LA	T23N, R4E Section 20	4/23/89	Fish
4	Ouachita River at Mollicy Farms Outfall, LA	T22N, R4E Section 17	5/24/89 4/25/89	Fish Fish
4a	Pierre Creek, LA	T22N, R4E Section 8	7/25/90	Fish
5	Penny Lake, LA	T22N, R4E Section 20	4/23/89 7/25/90	Fish Fish
6	Harrell Lake, LA	T21N, R4E Section 5	4/22/89	Fish

The two sediment samples from Mossy Lake and Fish Lake were analyzed and did not have detectable levels of 22 pesticides and 2 PCB congeners. Of the organochlorines detected in fish tissue, hexachlorobenzene (HCB)(Site 4), trans-nonachore (Sites 1 and 2), cis-nonachlor (Site 4), o,p'-DDE (Site 1, 2, 4, and 5), o,p'-DDT (Sites 1, 2, and 5), p,p'-DDD (Sites 2, 4, and 5), and mirex (Sites 2, 4, and 5) only o,p,'-DDE was present at all sites. These pesticides were found in 19 of the 25 spotted gar samples. The average pesticide concentration in the spotted gar was 0.05 mg/kg. White crappie and LMB contained an average pesticide concentration of 0.02 mg/kg. Results suggest pesticides were more likely to bioconcentrate in the spotted gar. PCBs were not detected in the fish or sediment (USF&WS 1992).

2.3.6.2 Volatile Organic Chemicals

Polycyclic Aromatic Hydrocarbons and PCBs

Six sediment samples were collected below Felsenthal Reservoir just upstream and downstream of Coffee Creek in April 1993. The samples were analyzed for benzo(a)pyrene, benzo(e)pyrene, flouranthene, phenantherene, chrysene, perylene, pyrene, and arochlor 1254 (PCB). The scale of the graphs in the FTN (1996) report for these chemicals only allowed an approximation of the detected concentrations. Except for PCB, all PAH concentrations were the same in all six sediment samples for each parameter (FTN 1996).

Benzo(a)pyrene was measured between 15 and 20 µg/g. Benzo(e)pyrene measured approximately 20 µg/g. Flouranthene was reported as 1 µg/g at these two stations, but was most probably a non-detect. Perylene was measure at approximately 10 µg/g. Phenantherene and pyrene were not detected. PCB was detected at approximately 0.01, 0.03, and 0.05 µg/g at the station just upstream of Coffee Creek and approximately 0.03, and 0.07 downstream of Coffee Creek.

The USF&WS (1996) collected sediment samples on May 24, 1989 from Mossy and Fish Lakes. These samples were analyzed for 14 PAHs. The results are shown in Table 2.8 below (USF&WS 1992).

Table 2.8 Polycyclic Aromatic Hydrocarbons

Parameter	Mossey Lake	Fish Lake
Naphthalene	0.19	0.01
Flourene	0.04	BDL
Phenanthrene	0.53	BDL
Anthracene	0.05	BDL
Fluoranthrene	0.14	0.01
Pyrene	0.15	BDL
1, 2,-benzanthracene	0.03	BDL
Chrysene	0.16	BDL
Benzo(b)fluoranthrene	0.06	0.05
Benzo(k)fluoranthrene	0.01	BDL
Benzo(e)pyrene	0.15	0.05
Benzo(a)pyrene	0.01	0.01
1, 2, 5, 6-dibenzanthrcene	0.02	0.03
Benzo(g, h, i)perylene	0.03	BDL
Total PAHs	1.57	0.17
2, 3, 7, 8-TCDD**	BDL	BDL

No data was found for acid-extractable or base/neutral-extractable organic chemicals. Parsons recommends sampling and analysis of these chemicals.

2.3.7 Metals

Arkansas' 1998 303(d) list indicates that the fish and wildlife propagation use are not supported downstream of Felsenthal Reservoir as a result of mercury contamination in fish tissue. Little to no metals data were found for the Arkansas segment of the Ouachita River addressed in this report.

Louisiana's modified court-ordered 1999 303(d) list indicates fish and wildlife propagation uses are not supported downstream of the Arkansas-Louisiana state line to the confluence of Bayou Bartholomew due to mercury, cadmium, lead, and copper. Mercury is address below. Parsons evaluated the cadmium, lead, and copper data from USGS Station 7364535 in Sterlington, Louisiana. Although there were detections above the stream standards that technically justify placing this segment of the river on the 303(d) list, the metal concentration detections are suspect because ultra clean metals sampling and analysis methods were not used. Therefore, Parsons cannot use the historical data to determine whether metals stream standards are actually being exceeded. Parsons recommends all future sampling and analysis for metals adhere to EPA's method 1631.

2.3.7.1 Mercury

In Arkansas and Louisiana, the controlling state water quality standards are 0.012 µg/L for dissolved mercury in freshwater. The standard is based on controlling mercury residuals rather than toxicity in aquatic organisms. Additionally, if the 4-day concentration for total mercury exceeds 0.012 µg/L more than once in a 3-year period, the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methyl mercury exceeds the Food & Drug Administration (FDA) action level of 1.0 mg/kg. If the action level is exceeded, the state must notify USEPA Region 6, initiate a revision of its mercury criterion in its water quality standards to protect designated uses, and take other appropriate actions such as issuance of a fish consumption advisory for the affected area (ADEQ 2001, LDEQ 2001). Fish consumption advisories in Louisiana are issue when mercury levels in fish tissue exceed 0.5 mg/kg. A TMDL for mercury for much of the Ouachita River watershed was developed in early 2002 (FTN 2002) and approved by EPA Region 6. Table 2.9 provides fish tissue mercury concentrations that required the TMDL development. All future sampling and analysis activities for mercury in the Ouachita River watershed be commensurate with the requirements outlined in the TMDL. All future monitoring (chemistry, fish, effluent, air) should be closely coordinated with ADEQ and LDEQ to address the data objectives and needs of the mercury TMDL.

Table 2.9 Mercury Concentrations in Fish

	Species Average (mg/kg)	Species Maximum (mg/kg)	Overall Site Average (mg/kg)	Overall Site Maximum (mg/kg)
Ouachita River Below Felsenthal[1]			**1.24**	**1.86**
Bluegill	na	0.49		
Black bass	na	1.36		
Flathead catfish	na	1.86		
Ouachita River Below Felsenthal Lock and Dam[1]			**1.44**	**2.90**
Flathead catfish	1.66	2.90		
Blue catfish	1.14	1.46		
Channel catfish	0.79	1.19		
Ouachita River Below Coffee Creek[2]			**na**	**1.2**
Bass	na	1.2		
Ouachita River Near Louisiana State Line[3]			**0.672**	**1.453**
Bigmouth buffalo	0.568	0.655		
Black crappie	0.891	1.16		
Blue catfish	0.700	0.700		
Bluegill sunfish	0.000	0.000		
Freshwater drum	1.453	1.453		
Largemouth bass	0.654	0.654		
Spotted bass	0.709	1.017		
White crappie	0.318	0.318		
Ouachita River At Sterlington, LA[3]			**0.758**	**1.241**
Bigmouth buffalo	0.477	0.477		
Black crappie	0.724	0.92w3		
Freshwater drum	0.706	0.821		
Largemouth bass	0.979	1.241		
Smallmouth bass	0.436	0.436		
Spotted bass	0.947	0.947		
White crappie	0.633	0.734		

1 ADEQ
2 FTN 2002
3 LDEQ

2.4 SUMMARY WATER QUALITY DATA TABLES

This historical summary only presents data collected in the last 10 years. Figure 2.1 identifies the location of four applicable water quality monitoring stations in Arkansas.

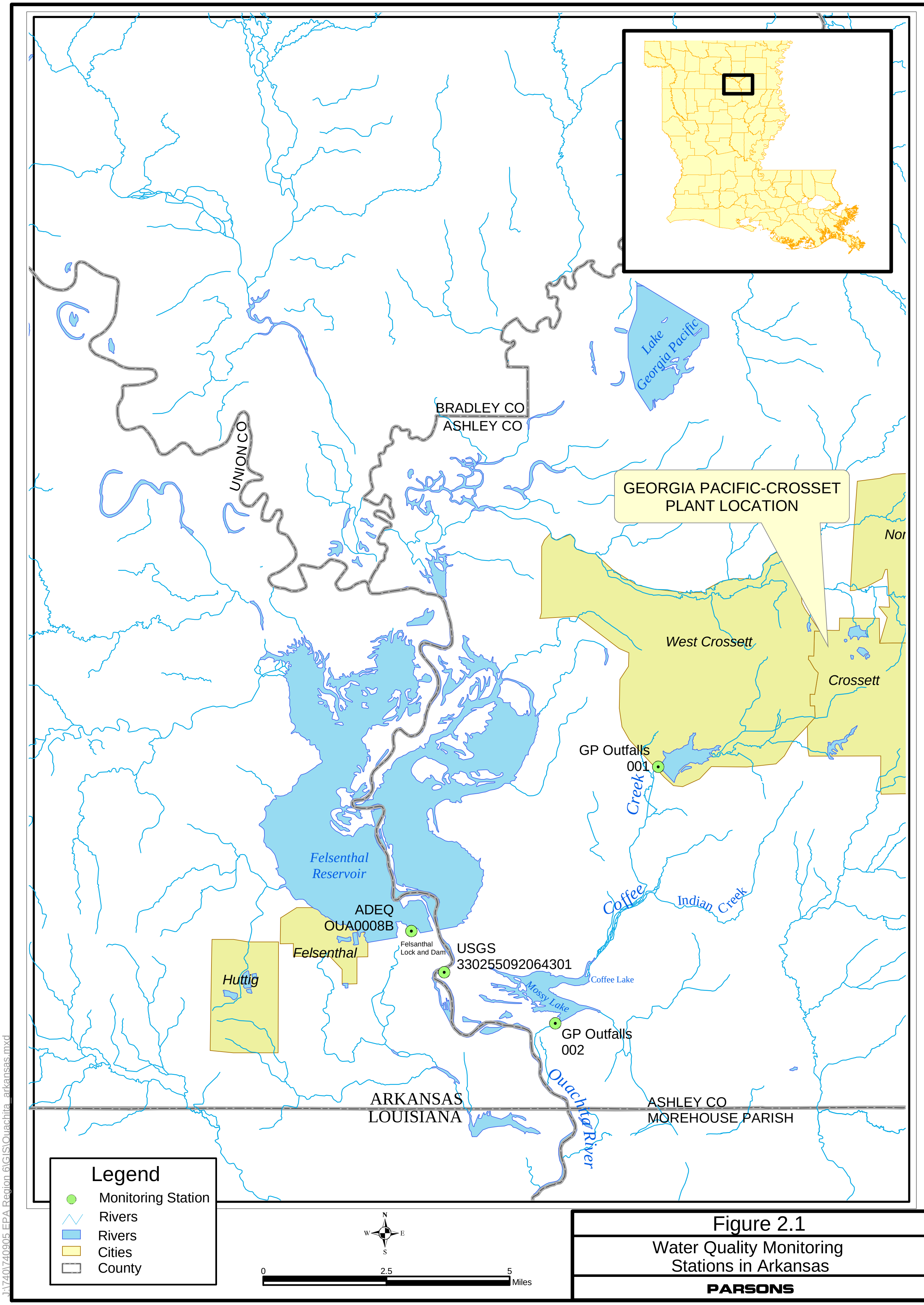


Figure 2.1
Water Quality Monitoring Stations in Arkansas

PARSONS

ADEQ monitoring station number OUA00008B located at the Felsenthal Lock and Dam on the Ouachita River has a period of record from August 1993 through May 2002. USGS Station 330255092064301 is located on the Ouachita River, upstream of the Coffee Creek confluence and has a period of record from October 27, 1997 through September 25, 2000. Outfall locations 001 and 002 are discharge monitoring points for the outfalls of Georgia-Pacific – Crossett paper mill wastewater treatment system, described in the Georgia-Pacific discussion in Section 3 of this report.

Tables 2.10 and 2.11 provide a comparison of historical water quality data to the ADEQ water quality standards. Comparison of conventional water quality parameters in Table 2.1 indicates the stream standard for turbidity is occasionally exceeded at Station OUA00008B, but not frequently enough to warrant concern or listing on the 305(b) report. Table 2.11 compares laboratory results for pollutants from Station OUA00008B to the water quality standards for the protection of aquatic life and human health. Water samples collected from USGS station 330255092064301 were not analyzed for pollutants toxic to aquatic species. Very little data have been collected for pollutants listed in the water quality standards. No conclusions or trends about the impacts these types of pollutants may be having on water quality can be ascertained from this sparse data set.

Only one government-sponsored water quality station, USGS Station 7364535, exists between the Louisiana-Arkansas border and Sterlington, LA. This station is located at the Highway 2 bridge in Sterlington (see Figure 2.2). The period of record for data assessed from this site is January 1992 to December 2001. Samples from this station are analyzed for conventional pollutants and metals. Table 2.12 provides a comparison of conventional parameters to analytical results of water samples from Station 7364535. Table 2.13 provides a comparison of water quality standards for toxic substances, including metals, organic chemicals, and inorganic chemicals. The data summaries provided for metals in Table 2.11 and table 2.13 should not be used as the basis of a use determination since ultra clean sampling methods were not used to collect these samples.

Table 2.10 Arkansas Water Quality Comparison for the Ouachita River Between Felsenthal Reservoir and the Louisiana State Line

				Max	Avg	Exc	Max	Avg
Bacteria	200	CFU/100 ml	April - September, geometric mean with no more than 10% of samples > 400	290	55**	NO		Unav
Cl	160	mg/l			Unav			Unav
Dissolved Oxygen	3	mg/l	June and July for Ouachita River Miles (ORM) 223 to ORM 221.1(Louisiana border	6.2 (min)	7.2	NO		6.4***
	4.5	mg/l	August for ORM 223 - 221.1	4.7 (min)	6.5	NO	7.7 (min)	8.3
	5	mg/l	September through May for ORM 223 - 221.1	5.7 (min)	7.6	NO	5.3 (min)	7.5
	no limit	mg/l	river stage above 65		Unav			Unav
	6.5	mg/l	March - May, Ouachita River above ORM 223 to Felsenthal Reservoir	5.9 (min)	7.4	2/15	5.3 (min)	6.3
	5	mg/l	June - February,				6.4 (min)	7.9
	4	mg/l	June - February,	4.7* (min)	7.4	NO		
pH	6.0 - 9.0	SU	must not fluctuate in excess of 1.0 unit over a period of 24 hours	8.1	6.2 (min)	NO	6.7	5.8 (min)
Radioactivity	3	pc/l	dissolved radium-226		Unav			Unav
	10	pc/l	dissolved strontium-90		Unav			Unav
.	1000	pc/l	gross beta concentration		Unav			Unav
SO_4	40	mg/l			Unav		21	10.6
TDS	350	mg/l		132	80.2	NO		Unav
Temperature	32	^oC (89.6 F)		32	20	NO	32	19
Turbidity	21	NTU		59	13	10/76		Unav

* Water temperature >22 degrees C
** Geometric mean
*** Single measurement on 6/5/2000
Unav = Database indicated measurement was not available

Table 2.11 Comparison Ambient Monitoring Data to Arkansas Numerical Water Quality Standards Criteria

Toxic Substance	Aquatic Life Protection Freshwater		Human Health Protection Drinking Water Supply	OUA0008B			
	Acute	Chronic		Max	Avg	Exc	% Exc
Pesticides and PCB's							
PCB's	--	0.014	0.4		ND[e]		
Aldrin	3	--	--		ND[e]		
Dieldrin	2.5	0.0019	1.2		ND[e]		
DDT (& metabolites)	1.1	0.001	--		ND[e]		
Endrin	0.18	0.0023	--		ND[e]		
Toxaphene	0.73	0.0002	6.3		Unav		
Chlordane	2.4	0.0043	5		ND[e]		
Endosulfan[a]	0.22	0.056	--		ND[e]		
Heptachlor	0.52	0.0038	--		ND[e]		
Hexachlorocyclohexane	2[a]	0.08[a]	37.3[b]		Unav		
Chloropyrifos	0.083	0.041	--		Unav		
Acid – Extractable Organic Chemicals							
Pentachlorophenol (pH = 6.84)	7.72	4.9	--		Unav		
Other Organics							
Dioxin (2,3,7,8 TCDD)			0.001		Unav		
Metals and Inorganics							
Cadmium[c] (d)	0.86	0.38	--		ND		
Chromium, Trivalent[c] (d)	182.07	59.06	--	0.85	0.68	NO	0%
Chromium, Hexavalent (d)	15.71	10.56	--		Unav		
Copper[c] (d)	4.78	3.59	--	5.70	1.78	2/31	6%
Lead[c] (d)	14.51	0.57	--		ND		
Mercury, Total Recoverable	2.04	0.012	--		Unav		
Nickel[c] (d)	452.84	50.29	--		ND		
Selenium, Total Recoverable	20	5	--		ND		
Silver[c] (d)	0.340	--	--		Unav		
Zinc[c] (d)	36.55	33.38	--	43.3	17.28	3/30	10%
Cyanide, Total Recoverable	22.36	5.2	--		Unav		
Beryllium	--	--	76		ND		

Period of Record - 2/20/96 through 5/28/02

[a] Total of all isomers

[b] Human health standard is for α–hexachlorocyclohexane

[c] Metals concentration calculated based on total hardness of 26 mg/l

[d] Mercury base on bioaccumulation

[e] Only one sample 8/26/97

(d) dissolved concentration

unav = Database indicated data was not available

Table 2.12 Louisiana Water Quality Comparison for the Ouachita River Arkansas State Line to Columbia Lock and Dam

Parameter	Limit	Unit or Measurement	Comment	7364535		
				Max	Avg	Exc
Bacteria	200	CFU/100 ml	May - October, mean with no more than 10% of samples > 400	5,000	155	14/118
Cl	160	mg/l		70	18	NO
Dissolved Oxygen	3	mg/l	June and July	2.8 (min)	4.9	1/20
	4.5	mg/l	August	4.5 (min)	5.6	NO
	5	mg/l	September through May	3 (min)	7.0	9/91
	no limit		river stage above 65 feet measured at the Felsenthal Dam and 2-weeks following flooding		Unav	
pH	6.0-8.5	SU		7.6	5 (min)	13/119
Radioactivity			Must no exceed levels established pursuant to Federal Safe Drinking Water Act		Unav	
SO_4	35	mg/l		45	13	2/119
TDS	350	mg/l		1,419	129	2/119
Temperature	33	^oC		34	20	2/120
Turbidity	50	NTU			Unav	

Table 2.13 Comparison of Ambient Monitoring Data to Louisiana Numerical Water Quality Standards Criteria

Toxic Substance	Aquatic Life Protection Freshwater Acute	Aquatic Life Protection Freshwater Chronic	Human Health Protection Drinking Water Supply	7364535 Max	7364535 Avg*	7364535 Exec	7364535 % Exc
Pesticides and PCB's					Unav		
Aldrin	3	--	0.04 ng/l		Unav		
Chlordane	2.4	0.0043	0.19 ng/l		Unav		
DDT	1.1	0.001	0.19 ng/l		Unav		
TDE (DDD)	0.03	0.006	0.27 ng/l		Unav		
DDE	52.5	10.5	0.19 ng/l		Unav		
Dieldrin	0.2374	0.0557	0.05 ng/l		Unav		
Endosulfan	0.22	0.056	0.47		Unav		
Endrin	0.0864	0.0375	0.26		Unav		
Heptachlor	0.52	0.0038	0.07 ng/l		Unav		
Hexachlorocyclohexane (gamma BHC, Lindane)	5.3	0.21	0.11		Unav		
Polychlorinated Biphenyls, Total (PCB's)	2	0.014	0.01 ng/l		Unav		
Toxaphene	0.73	0.0002	0.24 ng/l		Unav		
2,4-Dichlorophenoxyacetic acid (2,4-D)	--	--	100		Unav		
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP;Silvex)	--	--	10		Unav		
Volatile Organic Chemicals							
Benzene	2,249	1,125	1.1		Unav		
Carbon Tetrachloride (Tetrachloromethane)	2,730	1,365	0.22		Unav		
Chloroform (Trichloromethane)	2,890	1,445	5.3		Unav		
Ethylbenzene	3,200	1,600	2.39 mg/l		Unav		
1,2-Dichloroethane (EDC)	11,800	5,900	0.36		Unav		
1,1,1-Trichloroethane	5,280	2,640	200		Unav		
1,1,2-Trichloroethane	1,800	900	0.56		Unav		
1,1,2,2-Tetrachloroethane	932	466	0.16		Unav		
1,1-Dichloroethylene	1,160	580	0.05		Unav		
Trichloroethylene	3,900	1,950	2.8		Unav		
Tetrachloroethylene	1,290	645	0.65		Unav		
Toluene	1,270	635	6.1 mg/l		Unav		
Vinyl Chloride (Chloroethylene)	--	--	1.9		Unav		
Bromoform (Tribromomethane)	2,930	1,465	3.9		Unav		
Bromodichloromethane	--	--	0.2		Unav		
Acid – Extractable Organic Chemicals							
Methylene chloride (Dichloromethane)	19,300	9,650	4.4		Unav		
Methyl chloride (Chloromethane)	55,000	27,500	--		Unav		
Dibromochloromethane	--	--	0.39		Unav		
1,-3-Dichloropropene	606	303	9.86		Unav		
2-Chlorophenol	258	129	0.1		Unav		
3-Chlorophenol	--	--	0.1		Unav		
4-Chlorophenol	383	192	0.1		Unav		
2,3-Dichlorophenol	--	--	0.04		Unav		
2,4-Dichlorophenol	202	101	0.3		Unav		
2,5-Dichlorophenol	--	--	0.5		Unav		
2,6-Dichlorophenol	--	--	0.2		Unav		
3,4-Dichlorophenol	--	--	0.3		Unav		
Phenol (Total)5	700	350	5		Unav		
Base/Neutral Extractable Organic Chemicals							
Benzidine	250	125	0.08 ng/l		Unav		
Hexachlorobenzene	--	--	0.25 ng/l		Unav		
Hexachlorobutadiene6	5.1	1.02	0.09		Unav		
Other Organics							
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	--	--	0.71 ppq		Unav		
Metals and Inorganics (Hardness 39.46 mg/l)							
Arsenic	339.8	150	50	4.8	1.34	NO	0%
Chromium III (Tri)	256	83.12	50	4.2	0.69	NO	0%
Chromium VI (Hex)	16	11	50				
Zinc	52.05	47.53	5.0 mg/L		Unav		
Cadmium	8.98	**0.40**	10	3.6	0.47	18/106	17%
Copper	5.55	**4.14**	1.0 mg/L	17.9	3.06	7/96	7%
Lead	15.77	**0.61**	50	73.6	3.04	21/117	18%
Mercury	2.04	**0.012**	2	0.37	0.099	7/92	8%
Nickel	482.14	**53.55**	--	23	2.78	NO	0%
Cyanide	45.9	**5.4**	663.8		Unav		

Period of record - 1/6/92 through 12/4/01

* Average of values above detection limit unav = Database indicated data was not available

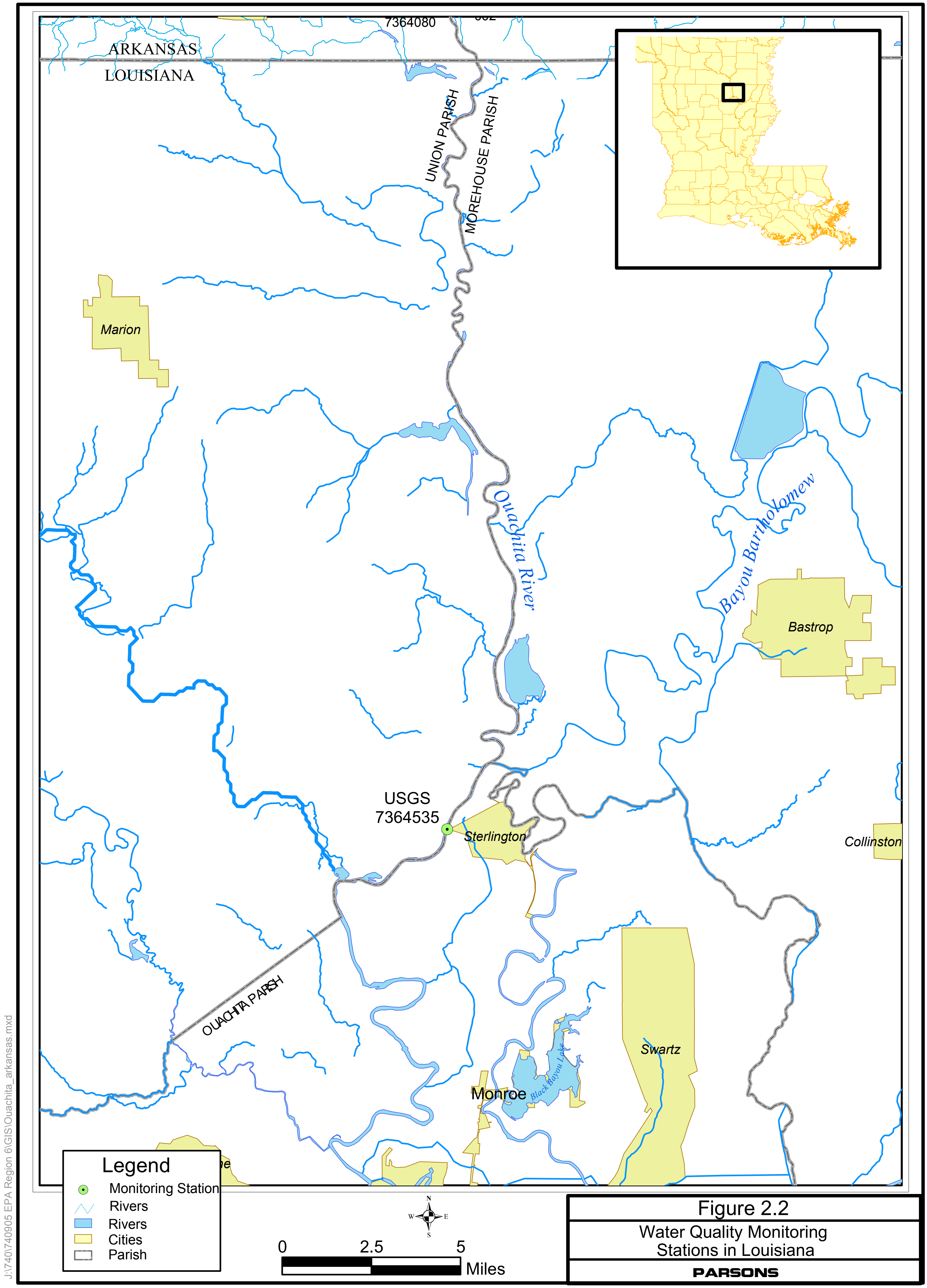


Figure 2.2
Water Quality Monitoring Stations in Louisiana
PARSONS

SECTION 3
GEORGIA PACIFIC – CROSSETT, DISCHARGE CHARACTERIZATION

3.1 GEORGIA-PACIFIC PERMIT

The Georgia-Pacific Corporation (G-P) owns and operates an integrated pulp, paper, and chemical plant located in Crossett, Arkansas (see Figure 2.1). The G-P plant has used Coffee Creek and Mossy Lake as a wastewater treatment system since 1937. Coffee Creek has been substantially modified over the years to transfer and treat the wastewater. G-P discharges approximately 45 million gallons a day (MGD) from its plant site to upper reaches of a modified Coffee Creek. The wastewater then flows into a manmade canal and then to a primary treatment system, which removes heavy solids. The primary treatment system consists of one or more clarifiers, which discharges sediment to a settling basin. The discharge from the settling basin enters Coffee Creek and travels approximately 1.5 miles to an on-channel 625 million gallon aerated lagoon. The City of Crossett wastewater ponds also discharge approximately 1 MGD to Coffee Creek approximately one half mile upstream of the aerated lagoon. G-P's first permit monitoring point, Outfall 001, is located at the cascade discharge of the aerated lagoon.

The G-P plant is authorized to discharge treated wastewater under an administratively continued National Pollutant Discharge Elimination System (NPDES) permit number AR 0001210, issued October 31, 1986. A day before the 1986 permit was to expire (October 31, 1991), the USEPA issued a permit amendment without renewal of the 5-year permit term. T he 1991 permit amendment was issued to incorporate effluent dioxin limits and fish tissue sampling not required in its previous permit (Shafii, personal communication 2002). No new permit has been issued since expiration of the 1991 permit, although a letter from the Arkansas Department of Pollution Control and Ecology (now called the Department of Environmental Quality) dated March 3, 1998 indicated that an administratively complete renewal application had been received. A partial permit application was also submitted in 2001. Since no new permit has been issued, G-P has been operating under the provisions of its 1986 permit and 1991 amendment.

G-P's Crossett, Arkansas paper mill has been permitted to discharge 48.5 MGD to the Ouachita River via Coffee Creek and Mossy Lake. The effluent is primarily composed of wastewater from paper production operations, including the plant's sanitary facilities. Other wastewater discharges from the facility include approximately 1.6 MGD added by its building products operations, 0.4 MGD resulting from its chemical plant operations, and an additional 1.0 MGD of treated sanitary wastewater contributed by the City of Crossett to G-P's treatment upstream of the aerated basin. Prior to discharge, the effluent is treated by screening, primary clarification, settling, and stabilization in an aerated basin. The aerated basin discharges via Outfall 001 to Coffee Creek, which flows into Mossy Lake. Coffee Creek and Mossy Lake provide some measure of dilution and effluent polishing by natural degradation processes and are considered to be part of G-P's treatment processes. Mossy Lake discharges to the Ouachita River through Outfall 002 (see Figure 2.1). Both Outfalls 001 and 002 are subject to effluent limitations and reporting requirements specified in G-P's NPDES permit (see Table 3.2). According to G-P's 2000 discharge permit application, the longitude/latitude for Outfall 001 and 002 are 92°02'17"/33°06'45" and 92°04'24"/33°02'00", respectively.

The G-P NPDES permit is unusual in that the City of Crossett discharges approximately 1 MGD of partially treated domestic wastewater from two facultative lagoons to G-P's aerated lagoon. The city is not a party to G-P's permit, which obligates G-P to full responsibility of the city's wastewater quality. The effluent limits are defined in G-P's permit for fecal coliform. However, fecal coliform levels may be an issue of concern since the City of Crossett discharges its municipal effluent into the G-P lagoons.

Georgia-Pacific submitted a priority pollutant scan (PPS) as part of its 1998 permit renewal application for the State of Arkansas. None of the priority pollutants, with the exception of mercury, were detected in the effluent samples from Outfall 001. Mercury was initially found at a concentration of 1.1 µg/L; however, mercury was not detected in four subsequent analyses (practical quantification limit [PQL] = 0.0002 µg/L). The effluent characterization analyses was for total recoverable mercury, while the state's water quality acute standard is for dissolved mercury and chronic value is for total recoverable.

Partial copies of the USEPA Application form 2C Section V - Influent and Effluent Characteristics, believed to be part of the 1998 renewal application, were obtained from ADEQ. Mercury in Outfalls 001/002 was listed as having a maximum daily concentration of 0.0012 mg/L (1.2 µg/L). In an explanatory note, G-P stated that it does not believe it contributes to the mercury in its effluent and submitted results of analyses performed on six effluent and three influent samples. The analyses were apparently for total mercury. The results are summarized in Table 3.1. The PQL appears to be significantly less than the PQL achieved for the samples submitted as part of the PPS but still significantly above the standard of 0.012 µg/L. Alternatively, the units could have been incorrectly identified. In either case, it is inconclusive, based on the small amount of data available, whether G-P is contributing mercury to the Ouachita River.

Table 3.1 Mercury Analysis Results

Influent		Effluent	
<0.00	mg/L	<0.00	mg/L
0.0002	mg/L	0.0002	mg/L
0.0002	mg/L	0.0003	mg/L
		0.0012	mg/L
		0.0007	mg/L
		0.0007	mg/L

Table 3.2 Summary of Discharge Limitations and Reporting Requirements

	Outfall 001				Outfall 002[1]			
	Discharge Limitations		Monitoring Requirements		Discharge Limitations		Monitoring Requirements	
	Daily Average	Daily Maximum	Frequency	Sample Type	Daily Average	Daily Maximum	Frequency	Sample Type
Flow (MGD)	Report	Report	Continuous	Record	Report	Report	Continuous	Record
Biochemical Oxygen Demand (BOD_5)	19,370 lbs/day	37,240 lbs/day	3 per week	24-hr composite	8,000 lbs/day	12,000 lbs/day	3 per week	24-hr composite
Total Suspended Solids (TSS)	35,190 lbs/day	65,470 lbs/day	3 per week	24-hr composite	16,000 lbs/day	24,000 lbs/day	3 per week	24-hr composite
2,3,7,8-Tetrachloro-dibenzo-p-dioxin (2378-TCDD)	5970 μg/day	5970 μg/day	1 per quarter	grab	--	--	--	--
Adsorbable Organic Halogens (AOH)	N/A	Report	2 per quarter	grab	--	--	--	--
pH[2]	--	6-9	3 per week	grab	--	6-9	3 per week	grab
Dissolved Oxygen[3,6]	--	--	--	--	report	report	1 per month	grab
BOD_5 Exceedances[3,4]	--	--	--	--	0	0	1 per day	report number
River Flow Rate[3,5]	--	--	--	--	report	report	1 per day	report

1 The effluent limitations for Outfall 002 are only effective when Mossy Lake is not flooded (defined as the period when the gage at Felsenthal Dam exceeds 62 feet and also for the two weeks following the recession of flood waters below 62 feet).

2 The pH must always be between 6 and 9 standard units.

3 These measurements are only taken during the summer months (July, August, and September).

4 A BOD_5 exceedence is when the daily maximum discharge (calculated by multiplying the average BOD_5 concentration from the previous 7 days by the daily flow and by the conversion factor of 8.34, a minimum of 3 individual samples is required to constitute and average) exceeds the following values:

BOD_5 = 3,340 lb/day for river flows < 780 cfs

BOD_5 = [3.054 x river flow + 958] lbs/day for river flows between 780 and 3,620 cfs

BOD_5 = 12,000 lbs/day for river flows > 3,620 cfs

5 The river flow is the arithmetic average of all data collected from the previous 7 days. A minimum of 3 daily flows from the preceding 7 days must be used. The flow data must be obtained from the USGS state line monitoring station.

6 DO is to be measured at 11 locations in the Ouachita River.

Of the few other compounds listed in Section V of EPA Application Form 2C, only zinc has numeric water quality standards in Arkansas and Louisiana. The 1998 permit application lists an effluent zinc (total) concentration of 1.12 mg/L (1,120 µg/L); however, this concentration is for total recoverable zinc and is not directly comparable to the dissolved zinc listed in each state's standard. The dissolved zinc acute and chronic water quality standards for the protection of aquatic life in Arkansas are 32.84 µg/L and 29.98 µg/L, respectively. Louisiana's dissolved zinc acute and chronic aquatic life standards are 52.02 µg/L and 47.53 µg/L, respectively. The pH for effluent from both outfalls has remained between the permit limits of 6-9 s.u. throughout the period of record. The average amount of adsorbable organic halogens in effluent from Outfall 001, for the entire period of record, was 2,510 lbs/day, but that amount has decreased dramatically over time. The permit did not specify any limitations on adsorbable organic halogens, nor do water quality standards exist, so no comparisons can be made.

Discharge monitoring reports (DMR) since 1992 were obtained from ADEQ and analyzed for compliance with the permit requirements. The average flow for the period of record from Outfall 001 was 42.5 MGD, but the flow has gradually increased over the last 10 years. The average flow in 1992 was 40.0 MGD while the average flow in 2001 was 45.1 MGD, which is much closer to the amount estimated in G-P's most recent permit applications. The flow from Outfall 002 is much more complex in that it is not uncommon for there to be no water released from Mossy Lake during the months of January through April or May. This, of course, varies somewhat from year to year. For periods when water is released from Outfall 002 the average flow is 40.1 MGD. This would seem to indicate that a substantial portion of water released from the G-P plant to Mossy Lake is lost to evapotranspiration or infiltration.

The DMR only report DO for the effluent from Outfall 002. The DO values, which were measured during the summer months, average 6.0 mg/L, with a minimum value of 3.4 mg/L. The DO measurements taken at the Ouachita River locations specified by the permit were not reported in the DMRs provided to Parsons. It is not certain whether these measurements were made and reported apart from the DMRs.

3.2 BIOCHEMICAL OXYGEN DEMAND

The BOD of effluent from Outfall 001 has an average, over the period of record, of 9,723 lbs/day with a maximum of 30,055 lbs/day. There were no exceedances of the permit provisions. The BOD of the effluent oscillates during the year with values around 15,000 lbs/day during winter months and much lower values during the summer months, likely to ensure compliance with the stricter summertime BOD limits placed on Outfall 002. The BOD of effluent from Outfall 002 shows a similar pattern of winter highs and summer lows, similar to Outfall 001, with the obvious exception that water is not typically released during several months of the year. There was only one reported exceedance of the maximum daily standard, which occurred in December 1997. The DMRs did not contain sufficient information to evaluate whether the stricter summertime BOD requirements were met, since only monthly averages are given and the permit requires daily comparisons based on the prior weeks' river flow and BOD concentrations.

However, the summertime average BOD was only 3,060 lbs/day for the period of record, which is lower than the amount specified for low flows in the Ouachita River, so it is likely that Georgia-Pacific has complied with the BOD permit limits.

3.3 TOTAL SUSPENDED SOLIDS

The total suspended solids (TSS) from Outfall 001 had an average value of 10,854 lbs/day and a maximum value of 58,272 lbs/day; no permit violations were noted. The amount of total suspended solids also varied somewhat with season, similar to BOD, but the values are more erratic. The average amount of total suspended solids for effluent from Outfall 002 was 4,418 lbs/day; however, there has been a slightly decreasing trend in the amount of TSS. The maximum amount of TSS in Outfall 002 effluent was 23,118 lbs/day. No permit violations were noted.

3.4 GEORGIA-PACIFIC FISH TISSUE DATA FOR DIOXIN

The 1991 permit modification required Georgia-Pacific to develop a plan of study to assess the levels of 2,3,7,8-tetrachloro-dibenzo-p-dioxin (2378-TCDD) and 2,3,7,8-tetrachloro-dibenzofuran (2378-TCDF). The plan was to be reviewed by USEPA Region 6 and, upon approval, become an enforceable part of the permit. The 1991 permit modification recommended that edible fish fillet samples be collected from three species of fish, including at least one bottom feeding species. Samples were to be collected once a year during the summer months and were to be composites of five adult fish of each species. Although the plan of study was not included in the permit materials supplied by ADEQ, Georgia Pacific has been collecting fish tissue samples both above and below the confluence of Coffee Creek and the Ouachita River.

The fish tissue analyses performed by G-P were obtained in electronic format from USEPA Region 6. Fish were collected a short distance upstream and downstream of Coffee Creek. See Table 4.1. Samples were generally collected once a year in the months of July through November, although more sampling events occurred in some years. Samples were generally composites of 2-6 individuals, although individual fish were also analyzed due to collection difficulties. Multiple species were sampled, although the number and identity of species collected was not constant between sampling events. The tissue samples were analyzed for 2378-TCDD and 2378-TCDF. The results, summarized in Table 4.1, were combined and expressed as a Toxic Equivalent Concentration (TEC).

The annual mean toxic equivalent concentration of all fish species is depicted graphically in Figure 3.1. The average upstream fish tissue dioxin concentrations, regardless of species, have been fairly low for the entire period of record. In late 1990 the average dioxin level was above the Louisiana Department of Health and Hospitals (LDHH)human-health based screening value of 1.56 μg/kg (Parsons 2002). Subsequent samples had lower concentrations and have been essentially zero since early 1993. It is uncertain why background concentrations were initially elevated; however, that is unrelated to the G-P mill, as samples were collected in presumably unaffected water bodies.

Table 3.3 Annual Average Dioxin Level for all Fish Species

	Upstream					Downstream				
Year	Average Dioxin TEC (pg/g)	Total Number of Samples	Number of Sample Dates	Number of Species		Year	Average Dioxin TEC (pg/g)	Total Number of Samples	Number of Sample Dates	Number of Species
1990	2.52	2	2	1		1990	19.09	4	2	1
-	-	-	-	-		1991	8.45	5	2	2
1992	1.30	3	1	2		1992	8.54	3	1	2
1993	0.00	2	1	1		1993	4.65	5	3	4
1994	0.00	4	1	1		1994	4.61	10	2	3
1996	0.02	6	2	3		1996	0.86	11	1	4
1997	0.20	5	1	2		1997	0.55	4	1	2
1998	0.00	4	1	2		1998	0.00	4	1	2
1999	0.04	6	1	3		1999	0.35	5	1	2
2000	0.02	6	1	3		2000	0.41	6	1	3

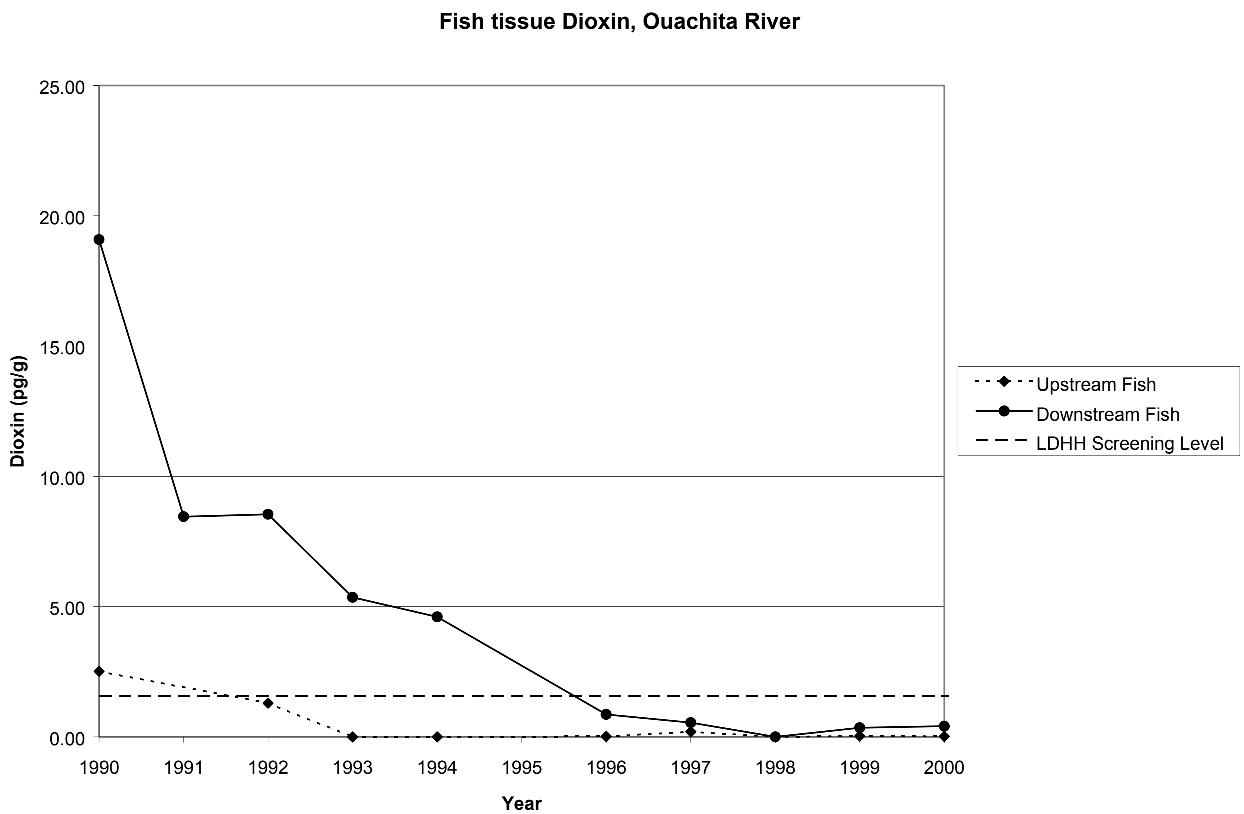
The average dioxin tissue concentrations of fish collected downstream from the G-P outfall have been generally decreasing over the period of record. Since 1996 the average TEC has been below the LDHH screening level. All the different species sampled show the same basic pattern of decreasing dioxin concentration with time and have generally been below the relevant screening criteria since 1996 (see Figure 3.2). The only exception is a blue catfish sample from 2000, which might be an outlier, since the concentrations had been decreasing in the preceding years. As a result of the decreases in fish tissue dioxin concentrations, which have been below relevant screening criteria for several years, USEPA Region 6 has recommended removing the reach of the Ouachita River below the Arkansas border from the Louisiana 303(d) list for impairment due to dioxin.

3.5 COLOR

Pulp and paper mills are known to generate tannins, humic acid, and humates that can significantly increase the color of the receiving water. In addition to largely aesthetic concerns, increased color can also limit light penetration causing a detrimental impact to primary production and aquatic life.

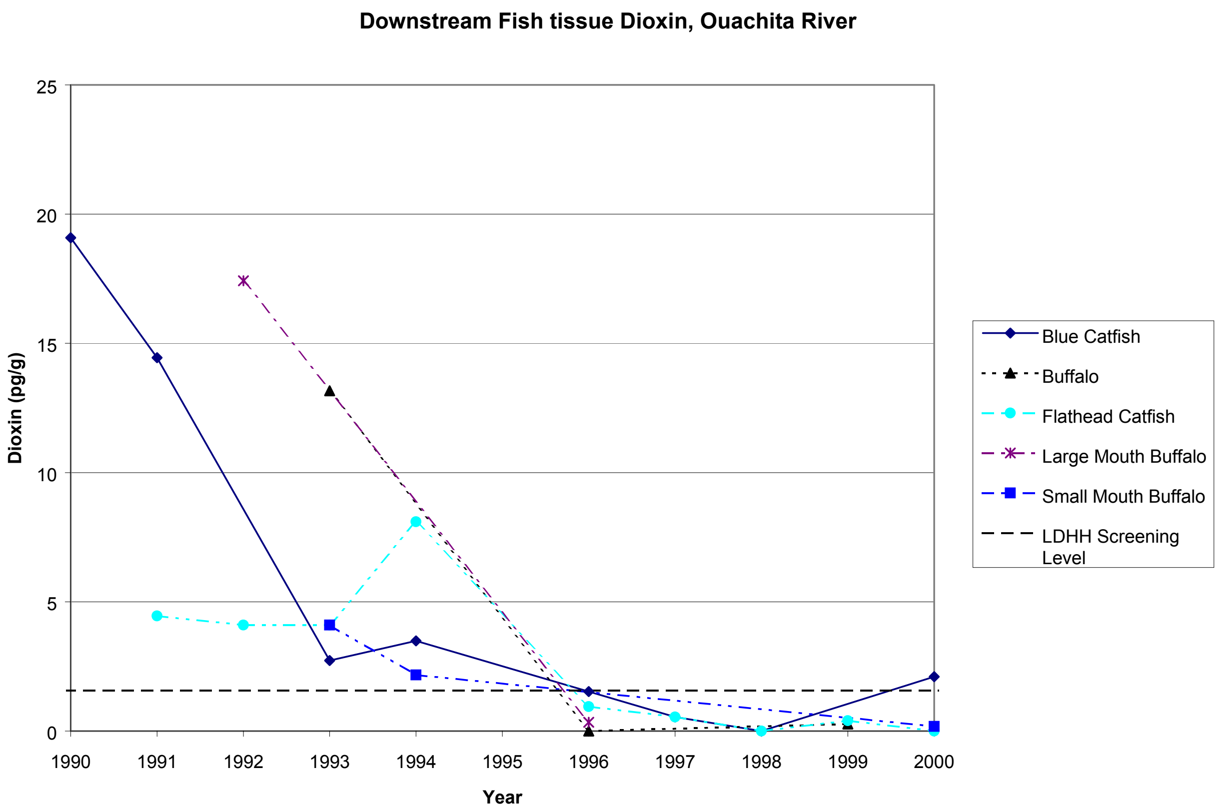
Both the States of Arkansas and Louisiana require that the true or apparent color of a water body shall not be increased to the extent that present or future uses of the water are impaired. Turbidity must be removed to measure true color. Apparent color, which is different than true color, is visually determined by comparing the sample to various standard colors.

Figure 3.1 Fish Tissue Dioxin Levels



Source: Parsons 2002

Figure 3.2 Downstream Fish Tissue Dioxin



Source: Parsons 2002

According to the G-P permit renewal application form 2C, Outfall 001 has a daily average color of 1291 units and a maximum daily value of 2004 units, while Outfall 002 has a daily maximum value of 2800 units. It is unclear whether these values are based on the platinum-cobalt scale, tristimulus light scale, or expressed in nephelometric turbidity units.

The increased maximum color reported for Outfall 002 compared to Outfall 001 may be the result of natural processes, such as decay of organic matter and run-off, in Coffee Creek and Mossy Lake. Resolution of the different reporting units is necessary between the water quality standards of G-P and the State. Further sampling is required to determine whether the color of the effluent deleteriously impacts the Ouachita River.

3.6 BIOMONITORING

The permit renewal applications from 1998 and 2001 indicate that both acute and chronic effluent toxicity testing have been performed on effluent from the Georgia Pacific plant since 1993. Results of these tests could not be obtained from ADEQ before release of this report. In addition, the 1991 NPDES permit amendment did not include toxicity testing, and no critical condition has been established for testing.

3.7 WATER QUALITY MODEL OF THE OUACHITA RIVER

Over the last three to four decades Georgia-Pacific has sponsored development of a number of DO water quality models, most recently the QUAL2E - Enhanced Stream Water Quality Model. The latest publication documenting the model parameters and results is the 1999 Total Maximum Daily Load Projections, Ouachita River, Felsenthal Lock and Dam, Arkansas to Sterlington, Louisiana by AquAeTer, Inc., of Brentwood, Tennessee. Georgia-Pacific and AquaAeTer are presently collecting additional data to satisfy model calibration requirements of USEPA Region 6. The model will be used to develop new NPDES permit limits for the G-P Crossett paper mill. The ADEQ is expected to issue the new NPDES permit in 2003, unless a contested public hearing is held.

The water quality model inputs and outputs should be considered closely when designing a future monitoring strategy for the Ouachita River, Coffee Creek, and Mossy Lake.

SECTION 4
SUMMARY AND RECOMMENDATIONS

In completing this report it became clear that providing an adequate assessment of narrative and numeric water quality standards for this portion of the Ouachita River in Arkansas and Louisiana was hampered by three conditions. First, the quality and quantity of data collected by ADEQ and LDEQ for many of the narrative criteria was limited. Many of the water quality conditions and point and nonpoint source pollutant loadings that can affect the aesthetic qualities defined by the narrative water quality standards are not addressed by routine field sampling of state water quality monitoring programs. Most data for narrative criteria were collected by local entities using special study approaches over short periods of time.

Second, the quality of the data sets for both narrative and numeric criteria is marginal. For example, some of the data addressing narrative criteria are anecdotal, and some of the units of measurement for data sets related to color and turbidity are unknown. For numeric criteria the value of the metals data collected between 1990 and 1999 is limited since ultra clean sampling techniques had not been used. For bacteria, monthly grab samples cannot be compared to the 30-day geometric mean as defined in the state water quality standards.

Finally, there is not sufficient spatial coverage and in some cases temporal coverage provided by existing data sets to provide adequate assessment of typical water quality conditions and use attainment, particularly for the portion of the Ouachita River below the confluence with Coffee Creek. The water quality monitoring network along the Ouachita River is insufficient to thoroughly assess impacts from the oil and gas operations, forest production, agriculture, dredging, and industrial discharges affecting the watershed.

4.1 RECOMMENDATIONS

Acquiring objective data of acceptable quality to fully assess the designated uses of the Ouachita River between Felsenthal Reservoir, AR and Sterlington, LA will require financial resources, coordination between USEPA Region 6, ADEQ, and LDEQ, and a well-designed sampling plan and quality assurance project plan (QAPP). While the ADEQ draft 2002 303(d) list indicates fish consumption uses are not met because of mercury contamination a significant amount of additional data is necessary to adequately assess other designated uses of the Ouachita River. Likewise, the LDEQ 2000 draft §305(b) report indicates a number of pollutants are causing fish and wildlife propagation impairment, for which a significant amount of additional data is necessary to verify this impairment and assess other uses designated for the River in Louisiana.

Because the analysis and determination of narrative criteria attainment are inherently less objective and consistent than for numeric criteria, a more comprehensive watershed-based approach to sampling must be implemented. Data quality objectives for determining use attainment based on a weight-of-evidence approach for narrative criteria must be better defined. While ambient monitoring conducted by ADEQ and LDEQ and monitoring requirements, as part of Georgia-Pacific's permit will continue, these routine data and their spatial and temporal coverage are insufficient to adequately assess water quality conditions of the Ouachita River. Additionally, a more detailed comparison between the Arkansas and Louisiana water quality standards and field sampling protocols used by the two different states is needed when designing a specific sampling plan to address this portion of the Ouachita River. Most notably, additional sampling stations are necessary downstream from the confluence of Coffee Creek and Ouachita River, specifically at the Arkansas-Louisiana state line. Sampling stations are also needed in Louisiana, downstream from the irrigation overflow releases related to row crop agriculture in Morehouse Parish.

A comprehensive intensive survey should be considered for the Ouachita River and Coffee Creek. The following list of water quality concerns should be addressed through a strategic, watershed–based monitoring plan and QAPP. Data quality objectives should be clearly defined as part of the QAPP. Given the complex nature of this water body and the interaction of concerns associated with multiple narrative and numeric criteria, chemical, physical, and biological data for all priority pollutants should be collected to more accurately assess water quality conditions. The sampling plan should place specific emphasis on collecting data for the following criteria defined by state narrative and numeric water quality standards.

4.2 NARRATIVE CRITERIA ISSUES

From the limited data acquired, the color in the Ouachita River downstream from Coffee Creek increases regardless of the sampling event. A sampling approach should be established to differentiate color alteration in Coffee Creek and Mossy Lake caused by the effluent from the Georgia Pacific mill or from color alteration caused by the natural effects of wetlands in the Coffee Creek, Mossy Lake subwatershed. Furthermore, the Ouachita River should be studied in more detail to determine if alterations in color to Coffee Creek are having a measurable impact on the aesthetics or aquatic biology.

While biological data are limited, it can be surmised that the aquatic habitat of the Ouachita River from Felsenthal Reservoir to Sterlington, LA has been altered by dredging and therefore is marginal at best. However, there is insufficient data to adequately characterize the benthic and fish community of the Ouachita River. Additional data, including reference site comparisons, should be collected to fully assess the biological integrity of the River in both Arkansas and Louisiana.

Very little recent data exists to accurately determine whether ambient toxicity is causing impairment of the fish and wildlife propagation use. Most of the historic data assessed in this report focused on sediment toxicity. Therefore, making a use impairment decision is further complicated by the lack of well-defined sampling and analytical protocols and the lack of numeric translators in the state water quality standards.

Additional water and sediment toxicity sampling is recommended, particularly downstream from Coffee Creek.

A long-term sampling and assessment approach for turbidity and suspended sediments caused by nonpoint sources and dredging should be developed for the Ouachita River. This should be coupled with a comprehensive approach to collect more nutrient data to adequately assess this narrative water quality standard in the Ouachita River. Special attention should be given to addressing the seasonal variability of these parameters when developing the monitoring strategy.

4.3 NUMERIC CRITERIA ISSUES

While the historic data indicate there is no concern for chlorides, sulfates, and TDS, additional monitoring should be conducted for these parameters downstream from Coffee Creek. Special attention should be given to determining if there are specific subwatersheds that may have oil and gas production in the past or ongoing.

In general, DO conditions in the Arkansas portion of the Ouachita River have improved since the USACE began releasing water over the top of the hinge crest gates at Felsenthal Lock and Dam in 1996 (AquAeTer 1999). Unfortunately, there are very little DO data for every month of the year, so there is an inadequate picture of the seasonal and diurnal DO cycle. Most DO data, since 1996, were collected from June through November. ASWQS for the Ouachita River below Felsenthal Reservoir have been defined to respond to seasonal flow conditions. The following is an excerpt from Appendix A of Regulation 2:

> *"Ouachita River - from Ouachita River mile (ORM) 223 to the Arkansas-Louisiana border (ORM 221.1), site specific seasonal D.O. criteria: 3 mg/L June and July; 4.5 mg/L August; 5 mg/L September through May. These seasonal criteria may be unattainable during or following naturally occurring high flows, (i.e., river stage above 65 feet measured at the lower gauge at the Felsenthal Lock and Dam, Station No.89-o, and also for the two weeks following the recession of flood waters below 65 feet), which occurs from May through August. Naturally occurring conditions which fail to meet criteria should not be interpreted as violations of these criteria (GC-3,#26)."*

Existing DO data suggest a consistent DO deficiency from the stations below Felsenthal Reservoir in April and May, but more DO, rainfall, flow, and flooding data are needed to adequately assess the River below Felsenthal Reservoir. Future DO sampling between Felsenthal Reservoir and the Arkansas-Louisiana state line should be done monthly, at a minimum, to adequately assess the seasonal variation allowed in the ASWQS. For the portion of the Ouachita River in Louisiana, USEPA should coordinate closely with LDEQ to determine how to most appropriately utilize a LDEQ-intensive DO survey scheduled for the Ouachita River basin in 2004.

Since the Georgia-Pacific discharge contains domestic wastewater from the town of Crossett, AR, bacteria sampling should be conducted on a routine basis in the Ouachita River downstream from Coffee Creek in accordance with the ASWQS. The Louisiana draft 2002 §303(d) list identifies Segment 080101 as not meeting primary contract recreation use as a result of high levels of bacteria. From the LDEQ listing, it is uncertain which portion of the Ouachita River is not meeting the contract recreation use given the limited data set available. Fecal coliform counts were performed monthly for the entire period of record. Total coliform counts were performed monthly from August 1992 until March 1996. Since only one sample was collected per month it is not possible to calculate a geometric mean, and any count above 400 (or 2,000) would appear to violate the 10 percent in 30 days rule. More intensive sampling efforts (for fecal coliforms analysis in May 1 through October 31, and total coliform analysis in November 1 through April 30) are required to determine whether this water body is in compliance with the bacteria standards. Additional bacteria data should be collected in compliance with the methods prescribed in the LSWQS on an annual basis, and more sampling stations are necessary to spatially define the area of impairment along the Ouachita River.

Very little existing water quality data was found regarding toxic substances such as pesticides, PCBs, volatile organic chemicals, and extractable organic chemicals. Most of the available data associated with these parameters are the result of sediment sampling conducted prior to 1996. At best this data can only be used for screening purposes to identify areas of concern for future monitoring. Therefore, additional monitoring for these parameters should be considered.

The value of all exiting water quality data, prior to 2000, associated with metals is limited since clean metals techniques were not used when samples were collected. Therefore, all future sampling and analysis for metals must adhere to USEPA's method 1631 to conduct an adequate assessment of the water quality criteria for metals.

All fish tissue and sediment data downstream from Coffee Creek should be guided by the requirements agreed upon in the USEPA-approved TMDL for mercury and as outlined in the Georgia-Pacific permit requirements for dioxin. Sediment sampling should be considered between Coffee Creek and the Arkansas/Louisiana state line, but sampling should be closely coordinated with LDEQ's statewide sediment sampling program.

All data collection needs outlined in this section will need to be prioritized through close coordination between USEPA Region 6, LDEQ, and ADEQ.

SECTION 5
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APPENDIX A
DATA SOURCES

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DATA SOURCES

1. Louisiana water quality data:
   http://www.deq.state.la.us/surveillance/wqdata/wqnsites.stm
2. USGS station 330255092064301 data:
   http://waterdata.usgs.gov/ar/nwis/inventory/?site_no=330255092064301
3. USGS Station 07364080 data:
   http://waterdata.usgs.gov/nwis/monthly/?site_no=07364100&agency_cd=USGS
4. Louisiana mercury in fish data:
   http://www.deq.state.la.us/surveillance/mercury/mercsite.stm
5. Louisiana water quality standards:
   http://www.deq.state.la.us/planning/regs/title33/index.htm
6. Arkansas water quality standards: http://www.adeq.state.ar.us/regs/default.htm
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